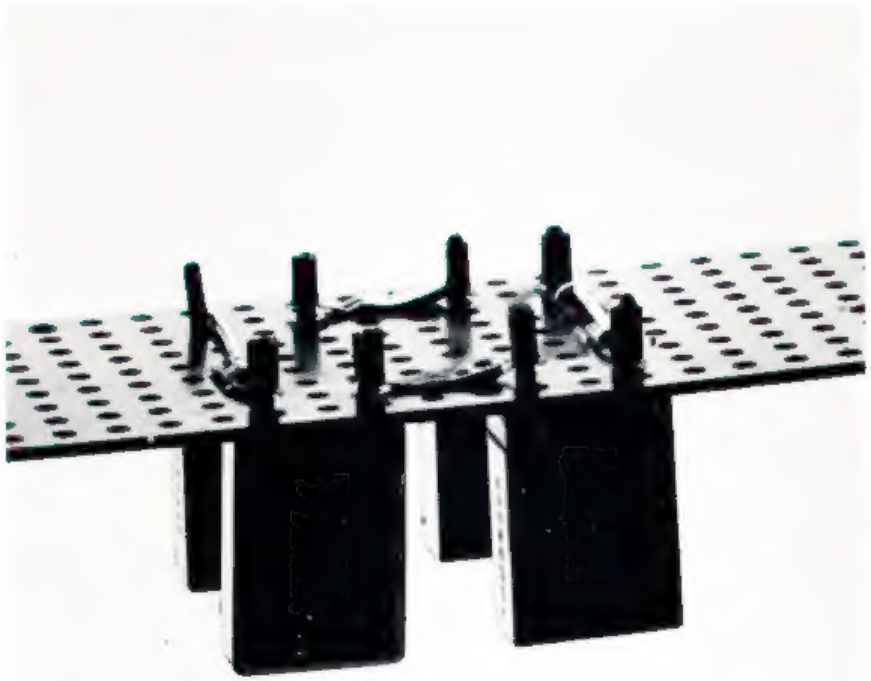
AMATEUR RADIO

OCTOBER 1963



Vol. 31, No. 10

2/-

Registered at G.P.O., Melbourne, for transmission by post as a periodical

NEW VALVES AT BARGAIN PRICES

1A3	2/6	10 a £1	3A5	10/-		6H6GT	3/6		7E6	3/6	7 a £1
1A5	5/-	5 a £1	3S4	10/-		6J5GT	10/-		7W7	2/6	10 a £1
1C7	3/-	7 a £1	5U4GB	14/6		6K7	5/-	5 a £1	12A6	4/-	6 a £1
1D8	7/6	3 a £1	5Y3GT	13/9		6K8GT	12/6		12AH7	5/-	5 a £1
1F5	10/-		6A3	7/6	3 a £1	6L7	5/-	5 a £1	12AT7	15/-	
1H4	5/-	5 a £1	6AB7	10/-		6SA7	7/6		12AU7	15/-	
1H5	7/6		6AC7	5/-	5 a £1	6SC7	7/6		12C8	5/-	
1H6	5/-	5 a £1	6AG7	12/6		6SF5	7/6	3 a £1	12H6	3/6	
1K4	5/-	5 a £1	6AJ5	7/6	3 a £1	6SF7	7/6		12J5	5/-	5 a £1
1K5	5/-	5 a £1	6AL5	14/-		6SH7	4/-	5 a £1	12SA7GT	10/-	
1K7	5/-	5 a £1	6AM6	(EF91) 10/-		6SJ7	12/6		12SC7	5/-	5 a £1
1L4	5/-		6B8	metal 17/6		6SN7	12/6		12SK7	5/-	5 a £1
1LN5	(CV781)		6BE6	15/-		6SQ7GT	22/-		12SQ7	5/-	
	5/-	5 a £1	6BQ5	17/-		6SS7	7/6	3 a £1	12SR7	5/-	5 a £1
1P5	2/-	10 a £1	6C4	5/-	5 a £1	6U8	17/-		14A7	3/6	7 a £1
1Q5	5/-	5 a £1	6C6	5/-		6V4	11/4		19	1/6	
1S2	18/-		6C8	10/-		6V6GT	16/-		30	1/3	
1S5	10/-		6CH6	2/-		6X4	10/-		35T	30/-	
1T4	10/-		6CM5	25/-		6X5	15/-		47	3/6	7 a £1
2A5	7/6		6F5	7/6		6Y6	5/-	5 a £1	57	4/-	
2A6	7/6		6F6	12/6		7A8	2/-	11 a £1	58	3/-	
2D21	12/-		6F8	5/-		7C5	5/-	5 a £1	717A	7/6	3 a £1
2X2	5/-	5 a £1	6G6G	7/6		7C7	2/-	12 a £1	807	7/6	3 a £1
3A4	10/-		6G8G	26/-					808	10/-	

815	15/-		EF50	(VR91)							
836B	15/-			and socket	3/6						
832A	19/6		EF70	5/-	5 a £1						
866	32/6		EF72	5/-	5 a £1						
954	5/-	5 a £1	EF73	5/-	5 a £1						
955	5/-	5 a £1	EF86	26/-							
956	5/-	5 a £1	EL41	10/-							
958A	2/6	10 a £1	EY91	5/-							
1616	20/-		KT61	(6V6)	15/-						
1625	5/-	5 a £1	QQE04/20	£3½							
1626	5/-	5 a £1	QQV06/40	97/6							
1629	5/-	5 a £1	RL18	7/6	3 a £1						
2051	5/-		UL41	7/6	3 a £1						
5763	28/-		VR53	5/-	5 a £1						
6146	£3/10/-		VR100	(6U7)	7/6						
6360	£2/10/-		VR102	5/-	5 a £1						
9004	5/-	5 a £1	VR103	5/-	5 a £1						
AV11	2/11		VR105	10/-							
EA50	2/-	10 a £1	VR136	2/-	12 a £1						
EC91/6AQ4	10/-		VR137	2/6							
ECC35	20/-		VT25	5/-							
ECH33	20/-		VT78	3/6							
EF36	5/-	5 a £1	VT127	4/11	5 a £1						
EF39	5/-	5 a £1	VT501	7/6	3 a £1						

SCOTCH BRAND RECORDING TAPE

Brand New, Bankrupt Stock
on 5¾" Reels
1275 feet, **42/-**; usual price 62/-.
850 feet, **30/-**; usual price 42/-.

SAKURA CIRCUIT TESTER

Model TR-6S

Sensitivity: d.c. 20,000 ohms/volt, a.c. 10,000 ohms/volt. Ranges—d.c. volts: 6, 30, 120, 600, 1,200v.; a.c. volts: 6, 30, 120, 600, 1,200v. D.c. current: 60 μA., 6 mA., 60 mA., 600 mA. Resistance: 10K, 100K, 1M, 10M ohms. Capacitance: 0.001-0.2 μF., 0.0001-0.1 μF. Inductance: 30-3,000H. Decibels: —20 to +17 db. (0 db.—0.775 volt—600 ohms). Dimensions: 4⅛" x 6¼" x 2⅜". Weight: 1.3 lbs.
Price £9/10/0 inc. tax.

COMMAND TRANSMITTERS

Range: 7 to 9 Mc., less Crystal **£6**

Log Books .... 5/6, postage 1/- extra

POWER CHOKES

12 Henrys, 125 mA., 275 Ohms, **£2/8/0**
12 Henrys, 100 mA., 290 Ohms, **£1/12/0**

ER22 GERMANIUM POCKET RADIO

Complete with earphones and instructions, **22/6**. Aerial wire to suit, 4d. yd. Ideal Xmas Gift.

BARGAINS! BARGAINS!

Six-Core Cable .... **1/9** yd.
Rienartz Coils, RC6 .... **12/6 each**
Sato Knobs, black & white, ¼" shaft, **1/6**
Plastic Valve Caps, suit 807, 866, **3/6 ea.**
Crystal Earphone, suit Trans. Radio, **6/6**
Dial Globes, Madza, **7/6** per box of 10.
Dial Globes, 40 mA. .... **1/- ea.**
Egg Insulators ceramic, 1½" & 1", **9d. ea.**
Three-core domestic Cable **2/3 a yard**
Hook-up Wire, 10/010, red, black and Green, **4d. yard**, or **200 yd. roll £3.**
Earphone Inserts No. 2, actuating diaphragm type, ideal as small spkr., **7/6**
Pye dble. bulkhead mtg. Coax Con., **2/6**
Pye Coax Connectors .... **4/- pair**
Crystal Sockets, DC11 .... **2/6 each**
Crystal Sockets, FT243 and min., **2/9 ea.**
SCR522 28-volt Genemotor power sup., ... **20/-**, 5/- packing
Low Impedance Headphones **12/6 pair**
Vibrators, Oak/M.S.P., 6 volt, synchronous, 7-pin, AV5211R **£1**
Octal Plug and Socket, American Ampenol, in metal screw case, **8/6 each**
Ceramic ¼" Shaft Couplings **3/6**
Vibrators, 4-pin 6 volt, non-synchronous, M437 .... **42/-**
Vibrators, 4-pin 12 volt, non-synchronous, M438 .... **42/-**
Valve Socket and Shield, 9-pin McMurdo **4/6**
EF50 Ceramic Socket **3/6**
EA50 Valve Sockets **1/6**
High Impedance Headphones, suitable Crystal Sets **25/-**
Belling Lee Coax Plug & Socket, **7/6 pr.**

ENGLISH INDICATOR UNITS TYPE 1

Contains: one 6" c.r. tube VCRX263, three CV327/EF52, five CV858/ECC91/6J6, two CV140/EB91/6AL5, and one 6V6GT. Brand new condition. **£6/10/0.**
5/- delivery charge to railhead.

RECEIVERS

Type R-4/ARR2, 234 to 238 Mc/s., **£5**
BC733-D, with valves, ... **£4/10/0**

METERS

0-50 mA., 3¼" round, 2½" hole, brand new .... **30/-** ea.
MR2P 0-1 mA., 1½" square, **35/-** inc. tax
MR65 0-1 mA., 3" square, **47/6** inc. tax
MO65 0-1 mA., 3½" round, **35/-** inc. tax

AMERICAN POTENTIOMETERS

American Bradley, 2" long, ¼" shaft, 1" diam. Available in following sizes: 10,000, 20,000, 25,000, 30,000, 50,000, 100,000, 250,000 ohms, and 2 megohms.
Price 2/6 each

CO-AXIAL CABLE

50 ohm, UR67, 3/8" diam., in 25 yd. Rolls **30/-**; or 1/6 yard.
50 ohm, 3/8" **2/- yd.**, £8/15/0 100 yds.
52 ohm UR43, 3/16" diam., in 12 yd. Rolls **15/-**; or 1/6 yard.
71 ohm UR32, 3/16" diam., in 100 yard Rolls **£7/10/0.**
72 ohm UR70, 3/16" diam., in 27 yd. Rolls **30/-**; or 1/6 yard.
72 ohm, 3/8" **2/- yd.**, £8/15/0 100 yds.

HAM RADIO SUPPLIERS

5A MELVILLE STREET, HAWTHORN, VICTORIA Phone 86-6465

We sell and recommend Leader Test Equipment, Pioneer Stereo Equipment and Speakers, Hitachi Radio Valves and Transistor Radios, Kew Brand Meters, A. & R. Transformers and Transistor Power Supplies, Ducon Condensers, Welwyn Resistors, etc.

North Balwyn tram passes corner. Money Orders and Postal Notes payable North Hawthorn P.O. 5/- Packing Charge.

"AMATEUR RADIO"

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910.

OCTOBER 1963
Vol. 31, No. 10

Publishers:
VICTORIAN DIVISION W.I.A.,
Reg. Office: 65a Franklin St., Melbourne, Vic.

Printers:
"RICHMOND CHRONICLE," Phone 42-2418. Shakespeare Street, Richmond, E.1, Vic.

★

All matters pertaining to "A.R.," other than subscriptions, should be addressed to:

THE EDITOR,
"AMATEUR RADIO,"
P.O. BOX 36,
EAST MELBOURNE, C.2, VIC.

Acknowledgments will be sent following the Committee meeting on the second Monday of each month. All Sub-Editors should forward their articles to reach "A.R." before the 8th of each month. Any item received after the Committee meeting will be held over until the next month. Publication of any item is dependent upon space availability, but in general about two months may elapse before a technical article is published after consideration by the Publications Committee.

★

Members of the W.I.A. should refer all enquiries regarding delivery of "A.R." direct to their Divisional Secretary and not to "A.R." direct. Non members of the W.I.A. should write to the Victorian Division, C/o P.O. Box 36, East Melbourne. Two months' notice is required before a change of mailing address can be effected. Readers should note that any change in the address of their transmitting station must, by P.M.G. regulation, be notified to the P.M.G. in the State of residence, in addition "A.R." should also be notified. A convenient form is provided in the "Call Book".

★

Direct subscription rate is 24/- a year, post paid, in advance. Issued monthly on the first of the month, January edition excepted.

★

OUR COVER

For full details of this month's cover photograph refer to Hints and Kinks on page 17.

EDITORIAL

★

For the past thirty-one years an unpaid voluntary committee has supervised the production of "Amateur Radio" magazine and it is fitting that in this anniversary issue all readers are more fully informed regarding their publication.

The cost of running "A.R." is borne by the Victorian Division, and in the opinion of the Publications Committee it is incorrect that any deficit is solely paid for by one Division; it is a national magazine. The question of finance has been highlighted by the continuing rising production costs, which threaten to use the slight financial resources of your committee. Past practice has been to utilise any excess income for improving "A.R.," but today this is impossible.

A solution is to increase, very slightly, the charge for "A.R.," but your committee consider that costs should not be increased to members or readers. Hence the problem is to improve the magazine without increasing its size, without increasing the cost of production, yet add features such as prediction charts, new valve data, new station call signs and addresses, etc. It is the considered opinion of the Publication Committee that "A.R." should have an increased technical content, but the only way new features can be added is to curtail some existing item.

As each Division publishes its own bulletin your committee considers that intrastate news and notes rightly belong in the Divisional bulletin. Accordingly "A.R." will decrease the space currently allocated for Divisional Notes, and will replace it with additional technical features.

Future issues of "A.R." will still have Divisional Notes but to a lesser extent, and these notes should be preferably of an interstate nature with a minimum of intrastate news. Fuller particulars will be sent direct to all concerned.

By making this information available to all readers it will ensure that everyone can logically discuss the matter and not blame their correspondent for omitting items they have forwarded for publication.

The cost of producing "A.R." is continuing to increase, and means have yet to be found to finance this inflating charge. The time must come when an approach will have to be made to each Division to agree to a very slight increase in the charge for "A.R.," but in the interim your committee will endeavour to continue to produce the same size of magazine each month. However it may be necessary to curtail the size of "A.R." if costs continue to rise. If it is essential to reduce the number of pages printed in any month, then all items in the magazine must of necessity be also curtailed. If you have ideas on this question of finance, it is suggested that you discuss them at your Divisional meeting.

K. M. COCKING,
on behalf of the Publications Committee.

CONTENTS

Modification of the 522 Equipment for F.M. Operation

Part One—TRANSMITTER AND POWER SUPPLY

E. C. MANIFOLD, VK3EM*

IT is not suggested that the 522 is of the same calibre as the more modern mobile equipment, but as a base unit it does give a good performance depending on, as any v.h.f. band, location, etc.

At this stage let us consider the reasons for a mobile fixed frequency net.

In an emergency, there is no doubt that all stations, fixed and mobile, operating on the one frequency in a given locality, provides communication of which all listening are aware of the situation, and very often can take action as required, at short notice where directed.

The equipment, being crystal locked on frequency, ensures that there will be no chance of mistuned equipment at a critical time during an emergency, and hence nothing of importance will be missed. This same advantage works in normal times, when a mobile station calls for a contact, there will be every chance that there will be some base station listening who will be willing to have a chat, or as has often happened, the mobile station wants direction as to his locality, where a particular street is, or where a Ham friend is located, and as also has happened, asked the base station for assistance in times of mechanical trouble with his car.

Single frequency operation also demands good net discipline with no long winded conversations when there are any other stations on the net, as this prevents one of the greatest advantages being used, that of "push to talk," to get the message over with the minimum of time. Push to talk is a **must** for this type of operation where there are anything up to 20 stations operating at one time, likewise a short pause should be made between overs for any other "break in" station.

Possibly the most attractive benefit to be derived from the f.m. mode is where QRM problems are at their worst, from car and electrical sources, as at the writer's location. It is not possible to listen on any band at this QTH without a noise limiter, due to the incessant passing of cars and arc welding equipment in the vicinity, but with this f.m. equipment, even the weak fluttery mobile signals are copiable, something that has been impossible with 144 Mc. a.m. equipment.

There is a further bonus with f.m. operation, not applicable to a.m., in that two groups of stations can work on the same frequency, providing that they are separated by a few miles, and the stations in each group are located fairly close to one another, when it will be found that the strong local signals will override the more distant station without any heterodyne, but with a series of "birdies" in the background, which is easy to copy through.

* 267 Jasper Road, McKinnon, Vic.

> • Having experienced the advantages of mobile f.m. operation with superseded models of commercial mobile f.m. sets, and knowing that the availability of this equipment has been limited, the suggestion that the well known and well used 522 surplus units may once again be re-vamped for this mode of operation, for use as a base unit, triggered the author into modifying the 522 for the second time. (See "A.R.," April 1948.)

So much for why! Let's get on with how?

Several modifications have been done to both receiver and transmitter sections by members of the mobile f.m. group in VK3 and while these mods. are not the only way to do the job, after much experiment and discussion the methods suggested are probably the most satisfactory, using as much of the original equipment as possible with a minimum of extra parts. This is also the reason for the alternative ways of modifying being presented.

THE TRANSMITTER

The modification to the transmitter is not as extensive as the receiver section and so will be treated first.

It is desirable for rapid frequency changing to pretuned f.m. transmitting and receiving channels that the original frequency changing mechanism be retained, either as electrical or manually operated, utilising the rotating selecting finger section of the ratchet motor to select the channel, with an extension shaft and knob with pointer to indicate the selected channel.

The existing mechanism can be used if a d.c. supply is provided for the filaments and relays, and a push-button or selector switch for channel selection by the ratchet motor.

The top rack will require modification as there are a number of circuits provided for in the original which have no value to our application, but this can be left to the individual requirements, keeping in mind the advantages of multichannel pretuned selector operation for the f.m. frequencies.

The rack at this location was entirely re-wired to suit the carphone control circuits, as the power supply and ancillary circuits (speaker, etc.) are used when the carphone is on a.c. operation and so had to be interchangeable.

The modifications in circuit diagram Fig. 2T are the result of the assembling of ideas, and I am indebted to many of the f.m. group for their suggestions, which have provided the basis of this arrangement.

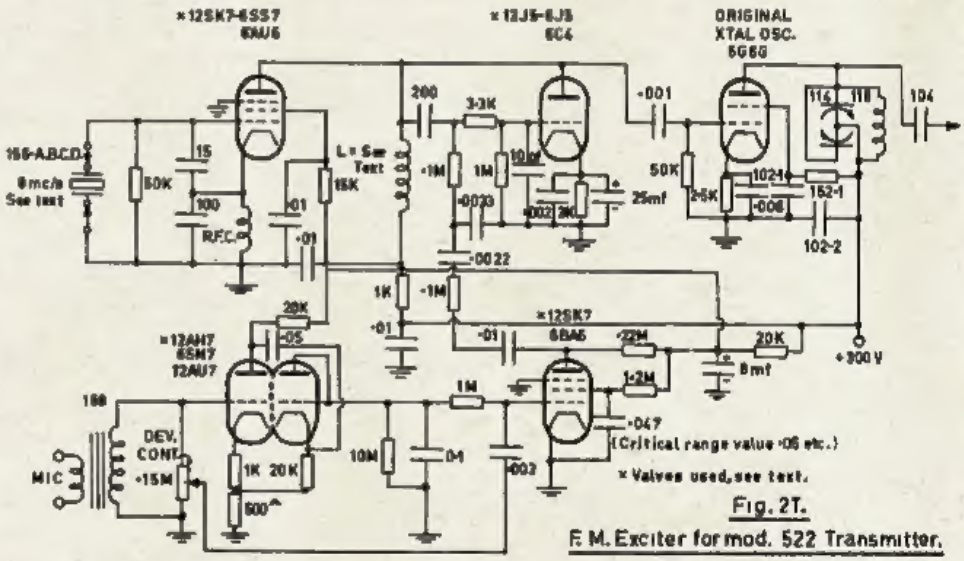


Fig. 2T.

F. M. Exciter for mod. 522 Transmitter.

It will be noticed that the valves used are of the older types, mainly because some came out of the 522 and others were available. Also it was thought desirable to re-use as much as possible of the existing parts.

However, if it is desired, equivalent miniature types have been indicated on the circuit diagram.

Before starting to remove unwanted parts, locate and link up from the modulation transformer the p.a. h.t. connections together with the h.t. line from the a.f. choke, as with a number of loose ends at a later stage these are a bit hard to trace.

Having done this, check with the original circuit (Fig. 1T) and remove the a.m. audio components with the exception of the mike transformer (158) and the speech amp. valve socket.

Remove all resistors from the resistor strips and replace in original location, as these will be re-used to mount other components when re-assembling.

The gain control (1 meg.) should be removed and re-used as the receiver gain control. The receiver gain control (150K) should be substituted as the deviation control, re-wired across the mike transformer secondary.

The audio section can now be re-wired as shown in Fig. 2T, when the components around the crystal oscillator have been removed.

Disconnect the crystal holders and switch from the existing 6G6G valve, but leave in position for re-connection to the new oscillator. Remove parts numbered in the original circuit as follows: 101-1, 103, 128-1, 128-2 and 151, re-connect 102-1 between screen and earth (at present connected to cathode) as screen by-pass.

The 6G6G now becomes a doubler stage only, by adding a 2,500 ohm cathode resistor and by-pass, together with 50K grid resistor and coupling condenser to the new crystal oscillator.

The original speech amp. valve is now used as the new crystal oscillator (6SS7) and is mounted on a small sub-chassis 4½" x 2", together with the frequency modulator valve (6J5) and associated components, in a vertical position, in line with the end of the crystal holder strip, centrally placed between the p.a. and audio screen bulkheads, leaving enough space to remove the valves from their sockets if necessary.

The 6SS7 is mounted on the top of the sub-chassis to provide short direct leads to the crystal holder switch, frequency modulator valve and 6G6G doubler.

All of the r.f. by-passes for the frequency modulator are mounted on the sub-chassis, but the 25 μF. audio cathode by-pass and some of the frequency correction network is mounted in the audio section under the chassis, beside the 12SK7 constant voltage amplifier.

A tinplate shield (jam tin) was fitted across the underside of the main chassis and connected to the resistor strip mounting brackets as a precaution against r.f. feedback from the 832 tripler to the audio section.

The audio section consists of a 6SN7 as a microphone amplifier and rectifier to provide an a.g.c. voltage for the grid of the constant voltage amplifier valve (12SK7). This is done to compensate for the different speech levels and prevent over deviation.

The main audio amplifier is the 12SK7 valve, capacitively coupled to the deviation control across the mike input transformer and fed via a frequency correction network to the grid of the 6J5 frequency modulating valve.

This network is intended to provide pre-emphasis characteristic suitable for communication quality speech with a variable reluctance microphone, but seems to be satisfactory for use with the average carbon mike used in most hand-sets.

Selection of the 6SN7 for the position was governed by the heater current of 0.6 amp., which allowed the 6SS7 and 6J5 heaters to be paralleled and in series with the 6SN7, and as already mentioned were available.

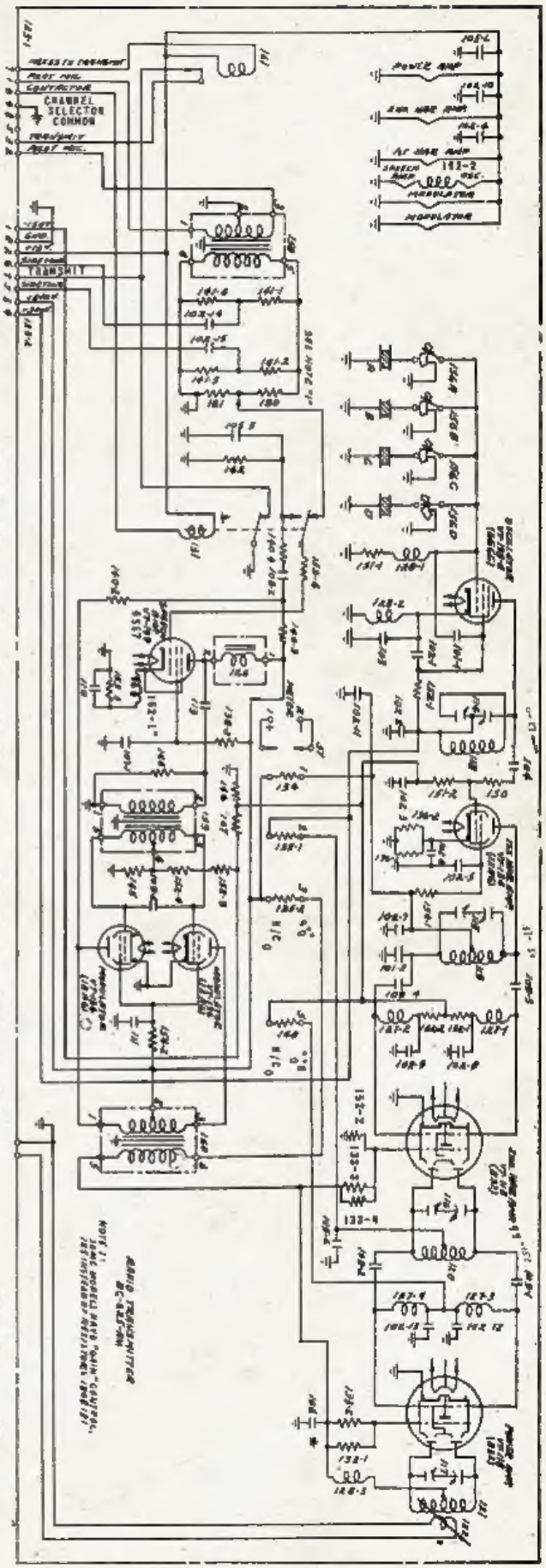


Fig. 1T.—Transmitter, BC625.

100—15 pF. ±1 pF., 500v. ceramicon.
101—10 pF. ±0.5 pF., 500v. ceramicon.
102—0.006 μF., 300v. mica.
103—50 pF. ±1%, 500v. silv. mica.
104—100 pF. ±5 pF., 500v. ceramicon.
105—0.001 μF. ±10%, 500v. mica.
106—0.002 μF. ±5%, 800v. mica.
107—0.1 μF. ±10%, 400v. mica.
108—0.001 μF. ±5%, 500v. mica.
109—20 pF. ±1 pF., 500v. ceramicon.
110—1 μF. ±15%, 100v.
111—0.5 μF., 400v.
113—0.0003 μF., 500v. mica.
114—11 pF. ±1 pF. min., and 65.5 pF. ±1.5 pF. max., in parallel.
115—3.5 pF. ±1 pF. min., and 27 pF. ±1 pF. max., in series.
116—3 pF. ±1 pF. max., and 16.5 pF. ±1 pF. max., in series.
117—2.8 pF. ±1 pF. min., and 11 pF. ±1 pF. max., in series.
118—9½ turns, 24 gauge enamel.
119—15 turns, 10 g., tapped 7 turns.
120—10 gauge.
121—2-0-2 turns, 10 g.
122—3 turns, 10 g.
125—1 meg., C taper.
126—430H., 5,000 ohms, 1 mA. max.
127—1 amp. 2½M. r.f. choke.
128—2.5 mH., 125 mA., 50 ohms, 1 pF.
130—Relay, 12v., 200 ohms, 0.2 sec.
131—Relay, 12v., 200 ohms, d.p.d.t. and s.p.s.t.
132—25,000 ohms, 1w.
133—40,000 ohms, 1w.
134—1.53 ohms, ±1%, w.w.
135—0.76 ohm, ±1%, w.w.
136-1 and 136-2—4,000 ohms, 1w. (making total of 2,000 ohms, 2w.)
138—1 meg., 5%, 1w.
140—½ meg., 5%, 1w.
141—1 meg., 5%, 1w.
143—82 ohms, 5%, 1w.
144—½ meg., 5%, ½w.
145—15,000 ohms, 5%, 1w.
146—6,000 ohms, 5%, 1w.
147—18,000 ohms, 5%, 1w.
148—75 ohms, 5%, 1w.
150—50 ohms, 5%, 1w.
151—50,000 ohms, 5%, 1w.
152—50,000 ohms, 5%, 1w.
153—2,000 ohms, 5%, 1w.
154—5,000 ohms.
158—1 : 45.7 ratio.
159—1 : 2 ratio.
160—2 : 1 ratio.
162—38 turns, 28 g. enamel.

The circuit for the 6SN7 is used in the carphone using a 12AU7 and works well. However, there are other ways of achieving this end so if it is preferred a diode rectifier can be used with another a.f. amplifier.

Should a crystal or dynamic microphone be required for use, it will be necessary to provide additional amplification between the mike and the 12SK7 c.v. amplifier valve.

A word with regard to the small, but important, coupling inductance between the crystal oscillator and frequency modulator plates. This coil requires to be untuned except by the plate capacities of the c.o. and f.m. valve, but is broadly tuned to be resonant at about 7 Mc.

Several inductances were tried, from a 2.5 mH. r.f. choke to the existing coil, both with and without iron and brass slugs, but the best operation was obtained with the following details.

Obtain a 7 mm. coil former, the one used came from Ham Radio Suppliers and was originally a 5.5 Mc. trap coil, but any 7 mm. former should do. Remove the iron slug and any existing windings, then wind 65 turns of 38 S.W.G. or 34 B. & S. enamelled copper wire. This will be approximately 7/16" long and take up almost all of the former, but is not critical. It is then installed between the 6SS7 and 6J5 unshielded on the sub-chassis.

It was thought that this system could have been used between the original 6G6G and 12A6, however it was realised that there would not be sufficient drive to the 12A6 for a tripler service, and led to the present arrangement, where there is ample drive for the 12A6 and up to approximately 30 kc. deviation at 8 Mc.

When obtaining crystals for this c.o. circuit, it would be advisable to specify the frequency required with a parallel capacitance of 30 pF., due to the wire and switch capacitance being higher than the usual Ham rig.

If it were found that the crystal was a little higher in frequency, it could be loaded with parallel capacitance to lower it to the correct frequency.

This is important with f.m. net operation as any appreciable difference in frequency at the discriminator or ratio detector will make the signal sound thin and distorted, also any background QRM will be noticed coming through with the signal.

Early in the f.m. picture in VK3, trouble was experienced with crystals reputedly on the same frequency, but when checked were sufficiently different to produce these effects.

It is most likely that all will be familiar with the tuning drill of the 522 transmitter, particularly if the unit has been used on a.m., but in case there are some who are using it for the first time, Table 1 will give an idea what to expect with regard to the meter readings. The meter should be an 0-1 mA. meter and have an internal resistance of 75 ohms.

It is recommended in the G.G. book that the plate current should not exceed 75 mA. with the aerial connected for the final p.a. Original 522 equipment operated with a plate voltage of 300v.

CRYSTAL FREQUENCIES

Channel 1: 145.854 Mc. 8103 Kc.
Channel 2: 146.000 Mc. 8111.4 Kc.
Channel 3: 146.146 Mc. 8119.2 Kc.
Channel 4: This can be your private link frequency. Hi!

TESTING

It is very desirable that any testing be done on another channel to No. 1. Alternatively, a shielded dummy load should be used on the transmitter to avoid QRM on the channel.

Since all receivers are crystal locked there is no chance of tuning off the frequency to avoid QRM caused by testing, and it has been found that QRM takes place up to five miles away with an unshielded dummy load, with the sensitive receivers in use on the frequency.

This particularly applies on initial tests when a new transmitter and a new operator get together.

The setting of the deviation control should be done with another station, after the r.f. section of the transmitter is working satisfactorily as there is no way of setting this control without a listening check, unless you have access to special equipment.

A rather rough guide can be obtained by separately powering the receiver and removing it from the immediate vicinity of the transmitter. Plug in a 0-1 mA. meter into the limiter grid metering socket and adjust the receiver to obtain an approximate reading of half saturation of the limiter, if possible.

Advance the deviation control until the limiter meter shows a kick downward, then reduce the control until there is just the slightest movement on speech peaks. As stated, this is a rough guide and it will have to be checked with another station for final setting.

The received signal should, of course, be clean, undistorted audio, even though it be received at such close proximity as your own shack.

The operation of the 6SN7 can be checked with a v.t.v.m. to see there is an a.g.c. voltage being developed at the grid of the 12SK7 under speech conditions which is necessary to ensure that the transmitter is not over deviated during normal operating.

Since completing the notes on the transmitter modification, other valves have been tried in the various socket positions, with suitable alteration to connections where required, to observe if there were any critical components with regard to similar valve types

As can be noted in Fig. 2T, the 12 volt series of tubes have been added, again because some are common to the 522 receiver and the 12SK7s were available.

All the older valves noted have been tried and found satisfactory, the miniature types are close electrical types and although not tried in the 522, are used in similar positions in the carphone equipment and the same results could be expected.

Meter Pos.	Stage Tuned	Tune for	Meter Circuit	F.S.D.	Approx. Reading
1	1st Doubler (Anode 6G6G)	Peak	1st Harm. Anode 12A6	50 mA.	0.5 to 0.7 (25 to 35 mA.)
2	1st Harm. Amp. 12A6	Peak	2nd Harm. Anode 832	100 mA.	0.5 to 0.7 (50 to 70 mA.)
3	2nd Harm. Amp.	Peak	P.A. Anode 832	100 mA.	0.6 to 0.75
	P.A. Anode	Dip	P.A. Anode 832	100 mA.	0.6 to 0.75
4	Tune All Stages	Peak	R.F. Indicator	1 mA.	0.4 to 0.8
5	Tune All Stages	Peak	P.A. Grids	2 mA.	Above 1 mA.
6	No circuit connect.				

Table 1.

Suggested Power Supply for Modified 522 Equipment

Although it is possible that everyone will have his own ideas on the subject of power supplies for the 522 gear, a control circuit and power supply circuit are attached which may serve for the ideas if nothing else.

The power supply case is used to house the external muting potentiometer, speaker volume control, speaker, and limiter grid current meter, in addition to the power supply equipment.

The transmitter h.t. supply is provided from a full wave voltage doubling silicon diode rectifier which delivers 300v. to the transmitter under load of approximately 250 mA.

Care should be taken to provide the output filter condenser with a voltage rating of 450v. working as the no load voltage rises to this value while receiving.

The receiver h.t. is obtained by using one of the silicon diodes as a half wave rectifier, as shown in the circuit diagram.

This gives 190v. under load of approximately 80 mA. and is more than adequate for the receiver to deliver enough audio to fill the shack and the back yard too.

Transmitter bias is obtained from a 130v. winding on the filament transformer, or a separate transformer if desired. A similar silicon diode, or a selenium rectifier, either half wave or bridge connected, could be used in this position followed by a resistance capacity filter and a VR150/30 voltage regulator, to deliver —150v. to the transmitter.

Filament requirements are met by using two 6.3v. 3a. windings in series to give the necessary 12v. for the 522 receiver and transmitter filaments.

Another half wave rectifier, silicon or selenium, is used to obtain d.c. from the filament supply to provide voltage to operate the aerial/h.t. changeover relay (412) via the handset microphone "push-to-talk" switch. It will be necessary to connect a large condenser (500 μF.) across this line to earth as a filter to prevent the relay from chattering.

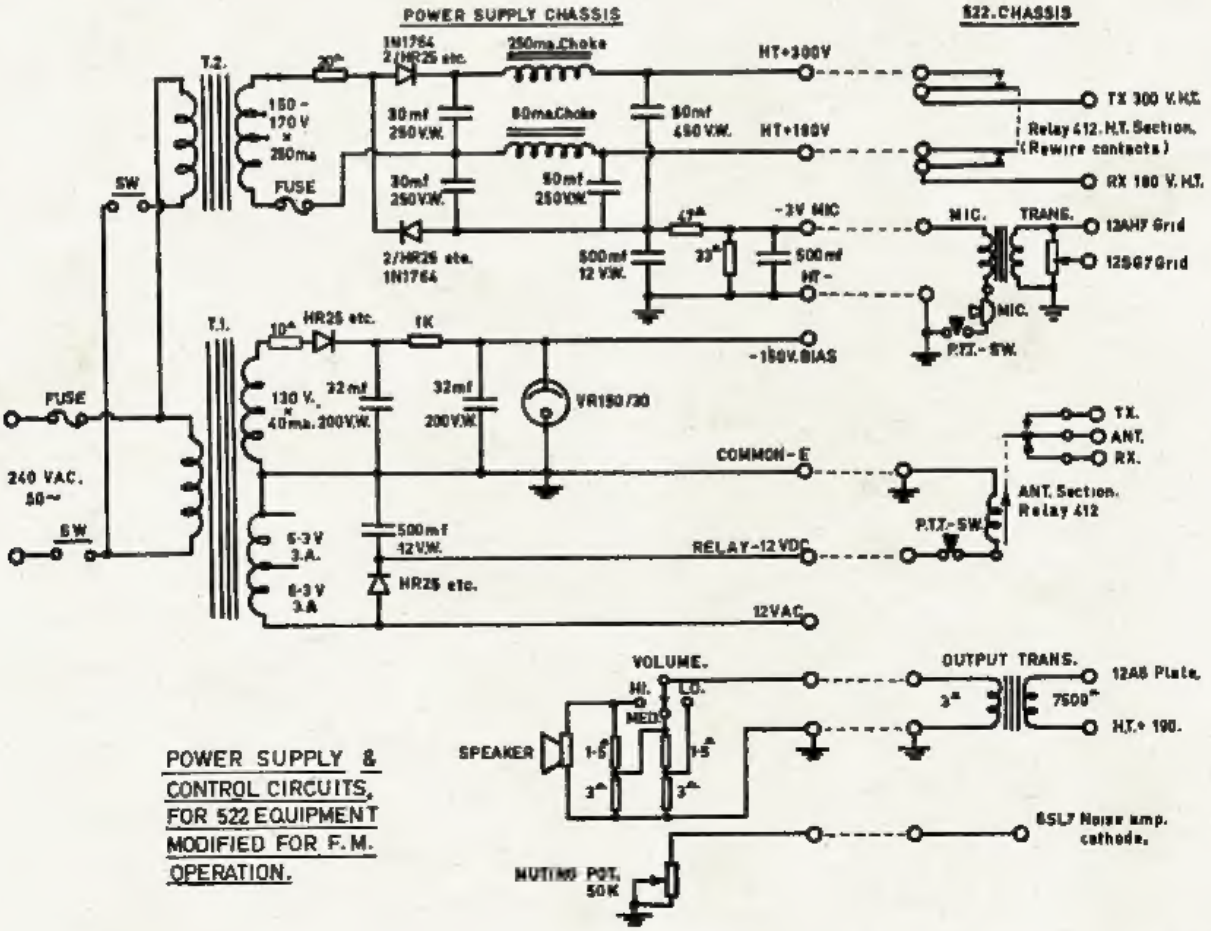
The microphone voltage is derived from a back bias resistor and filter in the negative h.t. lead and is supplied to the earthy end of the mike transformer which is connected to the mike and p.t.t. switch, then to earth return.

Since the speaker is in the power supply case, and the volume control is inside the 522 case, a stepped volume control was provided across the 3-ohm speaker line in the power supply case.

Generally the audio level is fairly constant over a large range of signal input over 5 μV., but there are times that it is desirable to increase the audio output if we want to move out of the shack while listening to the f.m. broadcast of the VK3WI news, etc.

This was the reason for putting the audio volume control in a more accessable place than in the top of the rack.

The original arrangement of the contacts of the aerial/h.t. changeover relay will have to be re-wired in the h.t. section to handle the two different voltages for the receiver and the transmitter as in the normal use there is only one h.t. voltage (300v.) which is switched to receive or transmit.



POWER SUPPLY & CONTROL CIRCUITS, FOR 522 EQUIPMENT MODIFIED FOR F.M. OPERATION.

IMPROVING YOUR MOBILE RECEIVER

*ROY HARTKOPF, VK3ZOM**

SINCE I have recently been in Amateur Radio I have received not only advice but also some very useful bits of equipment from helpful Amateurs. I hope that these tips may in turn be useful to someone else.

Because I have been travelling interstate my efforts so far have been concentrated on mobile work and I installed a 50 Mc. rig in the car. Provided one builds a shockproof rig, with preferably a transistorised power supply, the biggest remaining headache is that of noise. The first step was to try to eliminate noise in my own car.

The biggest single improvement it is possible to make in most cars is to put a coaxial capacitor between the make and break contacts on the distributor and the low tension connection to the coil. Unfortunately these capacitors are as scarce as hen's teeth. Merely connecting an ordinary capacitor of about 0.5 μF. from the wire to earth may not be very satisfactory.

In this case it is necessary to make some kind of filter. A shunt capacitor about 0.1 μF., a small choke, and another capacitor is quite effective. A distinct improvement can usually be realised by putting all these inside a metal box and using feed through capacitors at input and output. This almost approximates to a coaxial capacitor. The value of feedthrough capacitors should be as high as you can get.

The next problem is that of high tension ignition noise. The usual practice here is to fit suppressors, but I have found suppressor cable is not only more effective, but far cheaper into the bargain. Many modern cars, incidentally, have this fitted, so if you have a modern car—1955 onwards—check before you buy any. This suppressor cable does not have any wire conductor in the middle at all. Instead, there is a kind of string doped with resistive material and this gives a distributed resistance of about 3,000 ohms per foot of cable. In addition, the insulating material is rubber, not plastic, and this also helps to damp the radiation. A set of suppressors costs from two to three pounds, while the suppressor cable retails at 1/3 per foot and the car can be completely rewired (it probably needs it anyway) for about fifteen to twenty-five shillings.

Generator hash is another source of trouble, but this and many other minor noise sources have been so frequently dealt with that they are not worth mentioning here. Look up any Handbook which deals with mobile work.

NOISE LIMITER

Having quite effectively cut down radiation from my own car, I found that the noise level was still quite intolerable, particularly on busy roads. So I set to work to make a noise limiter.

The main problem here was lack of room to jam anything more into the car radio receiver. So the limiter had to be something which did not require much space.

* 34 Toolangi Road, Alphington, N.20, Vic.

The circuit shown in Fig. 1 takes very little room and is extremely effective. The only disadvantage is that the audio available at the volume control is cut to about half.

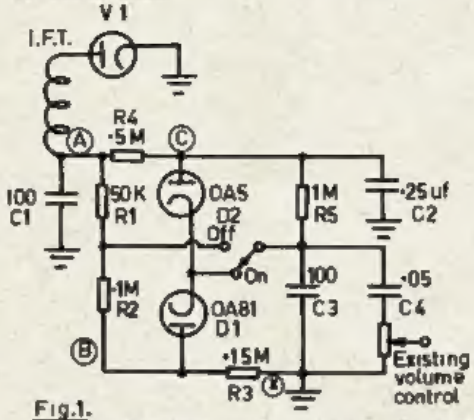


Fig.1.

(x) If V.1. has cathode bias then R3 is returned to cathode.

The method of operation is this. The detector diode creates at point A a negative voltage which is varying at audio frequency (the r.f. is by-passed by C1). Remember that this audio voltage is all negative because the positive cycles of r.f. and anything else are all cut off by the detector diode in the first place. Now at point B, we get exactly the same kind of voltage as we do at A, but half of it has been lost across R1 and R2.

At point C, however, the picture is quite different. Firstly, the voltage here is purely d.c. R4 and C2 act as a smoothing circuit and the voltage at C tends to rise to a value which is the average of the voltage at A, so that for half the time the voltage at A will be above the voltage at C, and for the other half of the time it will be below it.

At 100 per cent. modulation the audio voltage at A will go from nothing to twice the average (which is the voltage at C). So at 100 per cent. modulation the voltage at B (which is half the voltage at A) will swing from nothing to an amount which is equal to the voltage at C.

Now as long as the voltage at B is more positive (or less negative) than the voltage at C, there will be a current through D1, since its anode will be less negative than its cathode, and it will conduct. But as soon as a sharp negative spike appears at B the diode will cut off and the spike will be prevented from getting into the audio amplifier. In practice, through capacitance effects, etc., some of this spike may get through. But if it does, it will then cause the cathode of D2 to become negative with respect to the anode, which is tied to the voltage at C. Then D2, which is normally cut off, will conduct and the spike will be shunted to earth through the large capacitor C2.

One great advantage of this circuit is that the voltage at C automatically adjusts itself to the average strength of the carrier and so there is no need for manual adjustment. But as soon as any spikes come along which exceed the maximum modulation, they are cut off by the one diode and any remnant is shunted by the other.

This belt and braces method is very successful. Where previously it was difficult in heavy traffic, to read signals less than strength 8, it is now possible to read in comfort signals down to strength three and four.

The switch shown will boost the audio output and cut out the limiter when it is not needed. There is no great need for it, but it is nice to have if only to show one's friends how effective the noise limiter is.

BEAT FREQUENCY OSCILLATOR

Finally, with so many stations on single sideband a beat frequency oscillator is becoming a necessity, even in mobile work. Again with a car radio comes the problem of space. The obvious answer here is a transistor. A transistor oscillator for 455 kc. is very simple and we won't go into details here. But two points are worth mentioning. First there is no need to alter the wiring of the car radio. A couple of inches of wire hanging in mid air near the i.f. transformers will give plenty of injection. Secondly, the great snag about the normal b.f.o. is that space for a tuning control and on-off switch is just non existent in the usual car radio. The writer found the following solution a hundred per cent. effective.

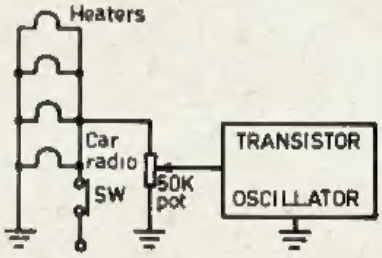


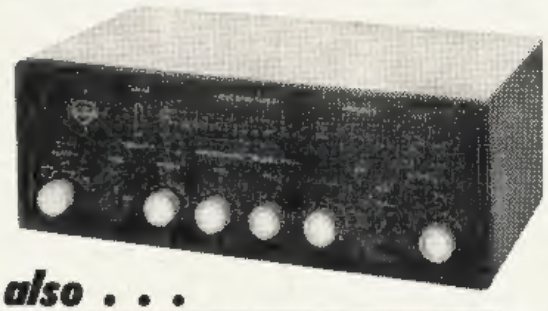
Fig.2.

The oscillator in question was made to take 1½ mA. at 6 volts. It would work quite well down to about 2 volts but the frequency varied with the voltage. So instead of connecting the oscillator direct to the battery, it was connected to the slider of a 50K potentiometer. The potentiometer (previously the tone control of the car radio, now put to better use) was connected as shown in Fig. 2. One side to battery and the other to earth. The potentiometer was set about half way and the b.f.o. tuned, with a slug, to 455 kc.

The remainder of the tuning is simply done by varying the voltage with the erstwhile tone control and when the b.f.o. is not required the tone control is turned fully round until there is no voltage on the oscillator. No switches, no tuning controls, no space headache. The variable voltage does the tuning. ●

Mullard Stereo Sound Systems

featuring . . .
Mullard Wideband Tuner
Stereophonic Pre-amplifier



also . . .

- **MULLARD STEREO "TEN-TEN"**
  (with printed circuit boards)
  Two 6GW8 triode pentodes and one low-noise AF pentode type EF86 in each channel provides a power output of 10 W at a total harmonic distortion of 0.05%. The input sensitivity (for 10 W output) is 260 mV.
- **MULLARD STEREO "THREE-THREE"**
  (with printed circuit boards)
  One 6GW8 triode pentode in each channel provides 3 W of audio power with a total harmonic distortion below 4%. The input sensitivity (for 3 W output) is 500 mV.
- **STEREOPHONIC TAPE RECORDER**
  3 W per channel with synchronised oscillators and with a modulation level indicator.
- **LOUDSPEAKER ENCLOSURES**
  Choosing and using loudspeakers.
  Enclosures for large audiences.
  Quality enclosures.
  Economy enclosures.

The amplifiers contained in this publication were designed by engineers in the Mullard Applications Laboratory, Sydney. Printed boards are used throughout to facilitate ease of assembly with the minimum of tools. Since "lay-out" problems are non-existent, the amplifiers, the pre-amplifier and the wideband tuner may be successfully constructed by the hobbyist and professional alike, to provide a source of high quality reproduction.

This booklet may be obtained by forwarding the coupon, together with remittance, to the addresses shown.

Mullard-Australia Pty. Ltd., Box 2118, G.P.O., Sydney, N.S.W.
Mullard-Australia Pty. Ltd., P.O. Box 97, Collingwood, N.5, Vic.

Please send me _____ copies of "Stereo Sound Systems" for which I enclose _____ remittance, being 6/3 plus 8d. postage per copy.

Name_____

Address_____

_____State_____

M118

Mullard

Mullard-Australia Pty. Ltd.

35-43 CLARENCE STREET, SYDNEY - - - - 29 2006
123 VICTORIA PARADE, COLLINGWOOD, N.5, VIC., 41 6644
Associated with MULLARD LIMITED, LONDON

M118

Pentagrid Mixers for S.S.B. Exciters*

HOWARD L. MORRISON, W7ESM

• The use of pentagrid mixers in home-brew s.s.b. exciters can, if great care is not taken, produce a large number of spurious output signals. The author shows how these spurious signals may be eliminated.

PENTAGRID (five-grid) tubes such as the 6SA7, 6SB7Y, 6BE6, and 6BA7 are familiar to Hams because of their frequent use in receivers. In most receivers they are used to change the frequency of the incoming r.f. signal to an intermediate frequency by heterodyning (beating) it with the local h.f. oscillator. In low cost receivers the pentagrid tube also oscillates in addition to its function as a mixer; when used in this way it is called a pentagrid converter. Pentagrid tubes are also often used as product detectors for s.s.b. signals, in which case the i.f. signal is heterodyned with a local i.f. oscillator, and the resulting difference frequencies are the desired audio signal.

Pentagrid tubes were designed especially for heterodyne mixing, and they offer certain advantages over other type tubes in this service. The signal grid (No. 3) draws no current, and so does not broaden the selectivity of the tuned circuit which drives it, and there is good isolation between the local oscillator and the signal circuits by reason of the screening effect of grids No. 2 and No. 4. These, together with other advantages to be described later, are good reasons for using pentagrid tubes as frequency converts in s.s.b. exciters. However, the writer has found that the operating conditions for these tubes in exciter use are quite different from their use in receivers if trouble with spurious signals is to be avoided.

FREQUENCY CONVERSION IN TRANSMITTERS

Once any modulated signal—a.m., f.m., s.s.b., or d.s.b.—is generated, its frequency can be changed only by the heterodyne method; that is, mixing it with the signal from a local oscillator (fixed or variable in frequency) in a device whose output will be the sum or difference of the original two frequencies. Such a device is called a mixer, but it must not be considered equivalent to mixers used, for example, in audio systems, where the output of a microphone is combined with that of a phono pickup. In audio mixers, the amplitude of the output signal is the sum of the instantaneous amplitudes of the input signals. No new frequencies are produced.

In a heterodyne mixer, the amplitude of one input signal is controlled in accordance with the instantaneous amplitude of the other one—which is another way of saying that it is an amplitude modulator. The modulated amplifier in an a.m. rig is actually a high-level heterodyne mixer, its output being not only the original carrier but new signals whose frequencies are the sum and difference of the carrier and audio signals. New frequencies are generated in the process of this kind of mixing.

A simple numerical example will show why the frequency of a modulated signal can be changed only by the heterodyne method: Say that a 7.250 Mc. carrier is modulated with 1,000 cycles of audio. The sideband components will be 7.249 and 7.251 Mc. If a frequency tripler stage were to follow the modulated stage, the new carrier would be 21.750 Mc. and the sidebands would be 21.7477 and 21.753 Mc., and a receiver tuned to it would produce 3,000 cycle audio, not the 1,000-cycle original. If voice modulation in such a set-up were used, the r.f. signal would require a channel three times wider than necessary, and the op. would sound highly unnatural. Changing frequency by means of doublers and triplers, even in a.m. rigs, can be done only ahead of the modulated stage. On the other hand, if the modulated carrier in the above example was mixed with a 14.500 Mc. signal, the new carrier would be 21.750 Mc., but the sidebands would still be only 1,000 cycles from it: 7.249 + 14.500 = 21.759, and 7.251 + 14.500 = 21.751.

PROBLEMS WITH HETERODYNE MIXING

Though heterodyne mixing solves the problem of changing frequency while preserving the frequency difference between the sidebands, it can add two special ones of its own, even with pentagrid mixers, unless special precautions are taken. These special problems are encountered only when the mixer output signal is at radio frequency; they cause no trouble in receivers, where the output of the mixer is very much lower in frequency than either input signal. Both problems stem from the lack of selectivity in the output circuit of the mixer, usually a single L-C resonant tank. If the mixer drives an amplifier which requires grid current, the load on the tuned circuit reduces its selectivity still more. Even going to the trouble of using double-tuned circuits often fails to reject sufficiently unwanted signals in the mixer output.

The first problem arises from using a mixer that requires one of the two input signals (usually the ones from the local oscillator) to be at least ten, and preferably more, times stronger than the other in order to minimise distortion in the mixer output. (Distortion means the production of unwanted frequencies, as will be seen later.) This relation is true for all diode mixers and most other type tubes used for mixing except for pentagrid tubes operated as described below. Pentagrid mixers used in receiving-type conditions also use a strong oscillator signal. To illustrate, suppose that it is desired to get an s.s.b. signal coming from a 460 Kc. filter into the middle of the 40 metre phone band. It could be mixed with a local oscillator of either 6.79 Mc. or 7.71 Mc.; to obtain 7.25 Mc. s.s.b. But notice the difficulty in expecting even a double-tuned r.f. circuit to pass 7.25 Mc. and reject a signal ten times stronger at 6.79 or 7.71 Mc. (If they aren't rejected, pink tickets will soon appear from the F.C.C. The loaded tank circuits in the linear amplifiers following the mixer will be fairly broad, and so offer only a little help in rejecting the unwanted signals.)

The second problem is the production of harmonics of one or both the input signals, together with beats between these harmonics, or between the original signals and the harmonics, all of which are called "cross-modulation products," or "spurious signals." Some of these unwanted signals often have a frequency such as to get by the mixer output circuit, along with the desired signal. When they do, the least that can happen is a flock of "birdies" in the local receiver—sometimes so many that it is very difficult or even impossible to tell which one corresponds to the transmitter carrier frequency when trying to set the v.f.o. The worst, of course, is that they will get amplified and radiated, clobbering different spots in the band unnecessarily, or else being outside the band altogether and so bring in pink tickets.

HARMONIC GENERATION

A long time before even the telephone was invented, mathematicians had proved that any waveshape can be made up by adding together, in proper amplitude and phase, sinusoidal waves whose frequencies are whole number multiples (i.e. "harmonics") of the frequency which corresponds to the rate of repetition of the original wave. In other words, any repeating wave, whatever its shape, is equivalent to the sum of a series of sinusoidal shaped waves which are harmonically related. Mathematical analysis also shows, and experiments demonstrate, that sharp corners in a wave mean many harmonics. (A theoretically perfectly square wave would have harmonics all the way to infinity.) The important thing to remember from this is that clipping a wave makes sharp corners, and therefore **clipping a wave generates many harmonics.** That is why the clipped output from a 100 Kc. crystal oscillator provides signals every 100 Kc. up into the v.h.f. range for calibrating receivers. It is also why a low-pass filter must follow the clipper in a speech amplifier. The filter removes many of the audio harmonics which would otherwise make the op's. voice sound harsh and raspy and broaden the signal bandwidth.

PREVENTION OF SPURIOUS SIGNALS

A diode is one of the very best clippers, and when most tubes are driven so hard that grid current flows, the

* Reprinted from "CQ," May, 1963.

grid-cathode circuit functions as a diode clipper. Now the operating conditions for pentagrid mixers which are found in tube manuals and Amateur Handbooks are for receiver applications, where things like conversion gain and the ability to handle a very wide range of signal voltages on grid No. 3 are important. Consequently, high excitation on grid No. 1 is recommended, with grid current between 0.35 and 0.5 mA., depending upon tube type. Such operation involves clipping of the signal applied to grid No. 1, and the consequent generation of harmonics. In an s.s.b. exciter built by the writer, when two of the 6SA7 frequency converters in the high frequency section were operated with 0.5 mA. current in the grid No. 1 circuit, there were about six birdies inside the ten metre band

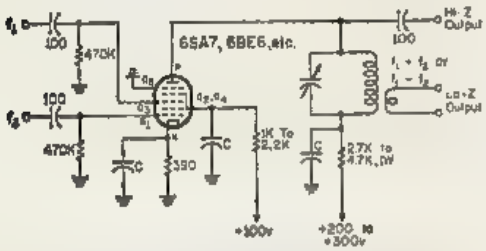


Fig. 1.—An operational pentagrid mixer circuit is shown above. By-pass capacitors C can be 0.005 μF. if all frequencies involved are higher than 400 Kc. If the output frequency is within 25% of f1 or f2, a double tuned output circuit is recommended. All resistors are ½ watt unless otherwise noted and all capacitors are in pF.

alone, with three of them so strong that the one corresponding to the desired output frequency could not be identified for purposes of setting the v.f.o. There were more birdies outside the band. (Incidentally, don't blame all birdies on the exciter. In the case just mentioned there were more birdies which were found to be images in the receiver, itself a fairly expensive double-conversion commercial model.)

In order to find more suitable operating conditions for pentagrid tubes in exciter service, a test circuit using a 6SA7 was set up. 60-cycle and 8 Kc. audio voltages were used for the control grids, and an 8 Kc. tuned circuit of fairly high Q was used in the plate circuit. A cathode ray oscilloscope was connected across this tuned circuit for viewing the output waveshape. Such an arrangement allows one to determine not only the bias and signal voltages which cause clipping, but also any significant distortion (implying the presence of harmonics) due to operating on the more sharply curved portions of the tube's characteristics. The scope picture produced by such a set-up will be that of an amplitude modulated signal like the ones pictured in the Amateur Handbooks, provided that the tuned output circuit has low impedance at 60 cycles. Clipping in the grid circuits will show up as "overmodulation on negative peaks," except when the higher frequency signal is applied to grid No. 1, and is also large in amplitude. Tests were therefore made with both input signals applied to grid No. 3 in turn.

The testing resulted in the following conclusion: For type 6SA7 pentagrid mixer with a plate supply of 300 volts, with 100 volts on grids No. 2 and No. 4, and with a cathode bias resistor of 390 ohms, the signal applied to either grid No. 1 or to grid No. 3 should **never exceed 2.5 volts r.m.s.** (or 3.5 volts peak). Under these conditions there is no clipping, no grid No. 1 current, and very little distortion in the output. This is shown in Fig. 1.

All of the advantages of pentagrid mixers are had, and the two special problems are taken care of. Other pentagrid type tubes were not available when the above tests were made, but they all appear to be similar, to judge from their rated operating conditions in tube charts.

MEASURING SIGNAL INPUT VOLTAGES

If a vacuum tube voltmeter with a probe for measuring r.f. voltages is available, checking the signal voltages applied to grids No. 1 and No. 3 is easy. Remove the tube from its socket and insert the probe pin or lead into the socket hole corresponding to the desired grid. If the signal sources are tuned circuits, these will have to be re-trimmed a little to compensate for the difference between the interelectrode capacity of the tube and that of the probe. Do not try to use a long wire to a v.t.v.m. having no probe. Long means anything more than three inches.

If a regular v.t.v.m. is unavailable, a simple one can be lashed up in a few minutes. A suggested circuit is shown in Fig. 2. The tube and socket can be the probe, so there are no chassis mounting problems. The grid coupling capacitor serves as the actual probe wire. The plate milliammeter can be calibrated for 2.5 volts and similar

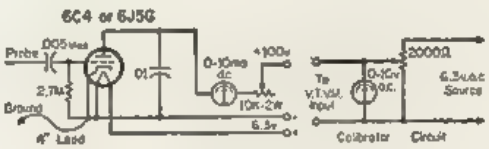


Fig. 2.—A simple v.t.v.m. that may be used to measure the signal voltages at the No. 1 and No. 3 grids. Also shown is a simple set-up that may be used for calibration.

values by using 60-cycle voltages from the heater circuit, as shown. In a simple v.t.v.m. like this, the meter "reads backwards," going down instead of up when an a.c. voltage is measured. It is not practical for measuring voltages more than about 8 volts, and the calibration is non linear (i.e. half a given meter reading does not mean twice the a.c. voltage). However, it is sufficient for the job at hand, and its simplicity and economy are attractive. ●

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

S.W. Receiver with 1.6-60 Mc. Frequency Range

H. F. RUCKERT, VK2AOU*

THIS receiver is being described for the benefit of Radio Amateurs, self trained like the author, who still like to design and build their own equipment, who have and can use small tools, soldering iron, multimeter and g.d.o., who wish to keep their knowledge in step with the developments of electronic technology, and not burden the family budget with purchase price plus hire purchase charges for commercial equipment. This article is for those who can build, calibrate and service their gear without a dealer's service department, and who are not worried about re-sale value when incorporating improvements.

It is hoped that this article will show the younger generation that it is possible to become Radio Amateurs without first becoming capitalists to whom the price of the gear and the width of the chromium strips are a measure of status. (See "QST," March 1963, p. 37.)

To show those who still care about true Amateur Radio and to myself, that we can build modern receivers, up to the standard of the art, the following receiver was designed and built using only those facilities he should have before he gets his call sign.

HOW IT WAS DONE

The first receiver of any Amateur station should be one with a wide frequency range. If one has an Amateur-band "only" receiver, then it is important to have a second receiver to check what appears between the Amateur bands. There are WWV and WWVH, interesting radio stations acting as guides to DX conditions, emergency stations, and by no means the least important, harmonics from your own transmitter.

The receiver the writer had for these purposes was 20 years old and modernising was best carried out by a completely new design and construction. It was, at the same time, possible to incorporate the features which make the Amateur-band "only" receiver so important.

Some of the valves had seen t.v. service, but inspection showed that they were still quite good. The Goerler turret for band switching was once donated by a friend for technical information. The HRO dial was found in the junk box together with all the resistors needed. The fixed capacitors and the trimmers are nearly all of the ceramic version. This is not surprising, as the writer's job is the development of ceramic dielectrics and their manufacturing processes with a local manufacturer.

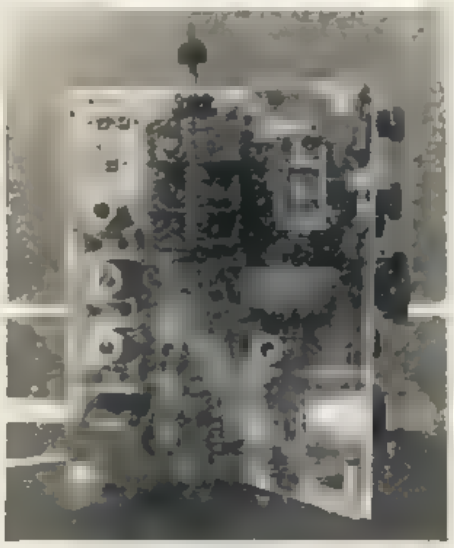
The crystals were of surplus origin and had been waiting many years for a suitable application. The mains transformer had burnt out in another receiver and was re-wound with the aid of a hand drill. Scrap metal was used for the chassis. All in all, not 1% of the price listed for this type of receiver in importers' catalogues was required to finance this home-brew project.

* 25 Berrille Road, Beverly Hills, N.S.W.

THE CIRCUIT

Modern mixer valves have such low noise figures that one r.f. stage is capable of bringing the signal well above the mixer noise. The pentode section of the first 6U8 works as the r.f. stage, whilst the triode section is used in the crystal calibrator. The Ge-diode in the calibrator circuit increases the harmonic content substantially and the 100th harmonic is still quite strong. The aerial coupling coil is connected in such a way that symmetrical feeders can be attached.

The Goerler turret (locally available) has six ranges on easily removable strips. Each strip has three slug-tuned coils with four chambers. Three chambers were used for the tuned circuit, whilst the other chamber at the cold end, where the slug is located, was occupied by the coupling or feedback coil as the case may be.



Short Wave Receiver. Top: xtal filter slugs, coils, padders and trimmers containing turret, three-gang air capacitor, fixed ceramic capacitors near switch. Left side: i.f. strip with open i.f. coil ends and associated parts under larger shielding cans. Bottom: power supply choke, output transformer, a.f. valves, S meter.

The 16 mm. diameter ceramic trimmers are mounted alongside each coil. The coil strips also hold the oscillator padder capacitors, which are low voltage polystyrene types.

With a constant C_{max} to C_{min} ratio for all ranges, it was only necessary to calculate for one range, the r.f. coil inductance, parallel trimmer capacity, the oscillator coil inductance, the parallel and series padder capacity, to obtain three-point tracking. With series or parallel capacitor padding alone, only two-point alignment would be possible per coil range.

The L and C values so obtained, a one-hour job with the slide rule, can be multiplied or divided by simple ratio figures to obtain the values for all six ranges. A graph showing μH. v. turns can be easily prepared on double log paper. Two coils are wound with the slug in a certain position having 50 and 10 turns, and a fixed close tolerance capacitor is connected in parallel with the coils. The g.d.o. tells the resonance frequency from which can be calculated the inductivity of the coils. A linear graph results on double log paper.

Using three chambers, the following formula can be used:

$$\text{Turns} = \sqrt[3]{n\ \mu\text{H.}}$$

The required bandspread is obtained by using five capacity ranges for each of the six coil ranges. In this way the frequency range of 1.6 to 60 Mc. can be split up in up to 30 ranges, which is necessary with a highly selective i.f.

The three-gang air dielectric capacitor covers 15 to 50 pF., and with a three-gang switch fixed ceramic capacitors of low TCc are connected in parallel, having 30 pF., 60 pF., 90 pF. and 120 pF. It is important that all fixed and variable capacitors are connected to the switch with very short leads, or series inductance will reduce their effect and the bands will no longer overlap at higher frequencies.

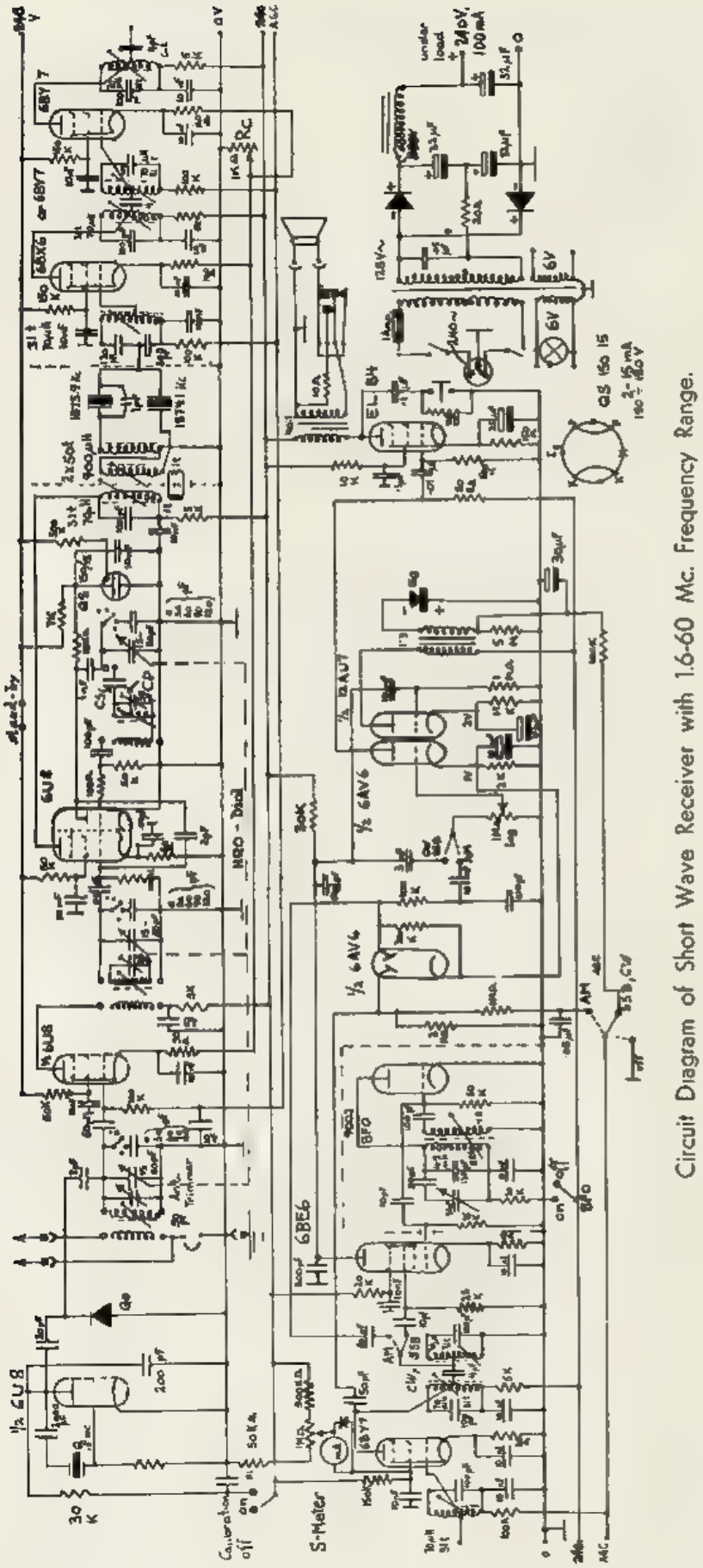
Additive mixing via 2 pF. is employed, which causes some pulling of the oscillator when the mixer tuned circuit is aligned. The oscillator tuning was checked with an absorption type frequency meter because it does not "lie," after the band-end frequencies had been worked out for each coil range.

The r.f. and mixer tuned circuits were pre-aligned with the g.d.o. Final alignment can be carried out by using the g.d.o., or what have you, as a signal generator. The bands were so shifted that all Amateur bands appeared within one particular dial range. The Amateur bands cover 60 to 140 dial divisions on the HRO dial, which is a satisfactory degree of bandspreading.

Omitting coil taps, it was easy to obtain good tracking, which is assisted by using part of the r.f. stage capacity as aerial tuning correction trimmer. This trimmer improves r.f. gain and selectivity by tuning out the reactance of the feeder and aerial, which changes considerably over the wide tuning range and from aerial to aerial.

The oscillator plate voltage is stabilised with the SQ150/15. The only time "take-off" is experienced occurs when the r.f. stage is tuned to the intermediate frequency, because too many stages then work on that frequency.

R.f. feedback is greatly suppressed by the shields between the coil sets per stage, which have individual earthing lugs. The turret axle too has a separate earthing lug. The rhodium plated alloy contacts gave no trouble during twelve years of servire of two similar turrets in my Hand-band receiver.



Circuit Diagram of Short Wave Receiver with 1.6-60 Mc. Frequency Range.

In the interest of temperature compensation, so that the drift is only in one direction, it is vital to place all the frequency determining L and C components on one side of the chassis, close together, and near warming up components, so that the L and all C's arrive at the same temperature at the same time. The compensation per range depends on how far the oscillator coil slug has been screwed in the coil. The N TCL iron coil slugs require P TCc capacitors, whilst ferrite P TCL slugs require N TCc capacitors.

To obtain sufficient image rejection with only two r.f. tuned circuits, it is necessary to use a fairly high i.f. of 1.5 to 5 Mc. Double conversion, advocated by the author since 1934 in Amateur publications, would give too many birdies with the wide frequency range to be covered, so single conversion was used.

The selectivity required today was obtained with a crystal filter, using two fixed adjusted crystals, which had no side responses. To utilise the selectivity offered by crystals, we must shield the i.f. sections of the receiver so well that they are as r.f.-tight as a good signal generator. If we have 1 mV. i.f. at the xtal filter, and 1 μV. (which does not seem to be much) leaks around the crystal, we cannot suppress off resonance signals more than —60 db. Insufficient shielding seems to be the main trouble of home constructions. See how this is done in the old HRO!

The second source of trouble is the matching of the crystal or crystals to the adjacent i.f. tuned circuits. A bifilar 1st i.f. filter secondary winding helps to bring identical voltages of opposing phase to the crystals. Lead lengths and component layout have to be selected in such a way that symmetry is not disturbed, or trimmer capacitors are required to correct this condition.

The i.f. coils have been wound on locally manufactured ferrite coil forms as used in transistorised receivers. The following coil inductance formula applies:

$$\text{Turns} = 3.7\sqrt[3]{n\ \mu H}.$$

To achieve symmetry, inductive coupling between the coils of the 1st i.f. filter was used. A one-turn link gives a very tight coupling, which can only be reduced by placing a large capacitor (1,000 pF. or so) or a resistor between the link coil turns. If the coupling is reduced too far, the tuning of the mixer stage plate circuit becomes critical and an increasingly deep dip between the crystal resonance peaks shows up, which is undesirable.

The bifilar coil tunes with the attached capacities close to the i.f. frequency of 1875 kc., but both first i.f. coils tune very broadly. To get the anti-resonance poles close and symmetrically placed to the resonance frequencies of the crystals, a one pF. capacitor parallel to the crystal with the higher frequency was all that was required. The flat top pass band within —3 db. points is about 3 kc. wide, and the poles with a frequency spacing of 7 kc. are 80 db. down. The small side lobes are down 60 db.

Of extreme importance is the capacitive tap (or inductive transformation point if used) at the next i.f. tuned circuit. The desired flat top and much of the crystal selectivity is lost if the

capacitor at the hot end of the next i.f. tuned circuit becomes too small. If the opposite case is used, a deep dip will be caused between the extremely sharp crystal peaks. A capacity tap compromise has to be found suitable for the frequency and type of crystal used The third i.f. tuned circuit has to be tuned correctly to obtain a symmetrical i.f. response.

The crystal filter was separately adjusted and tested by using the g.d.o. as signal generator and a 50 μA. meter was converted with a GE diode, a resistor and two capacitors to measure r.f. Time spent at this point is well worth while.

With little r.f. gain at higher frequencies, most of the amplication had to be achieved in the i.f. section Three stages with t.v.-i.f. type valves like the 6BY7 were selected. Extra shielding precautions were necessary to prevent i.f. feedback and oscillation. Small shields were soldered between the grid and plate valve holder lugs. Small shielding cans had to be put over the open ends of the i.f. coils, covering also the adjacent capacitors. Only shielded wire came out of the cans. The screen grid voltage of the i.f. valves was reduced and made gliding by using higher dropping resistors.

4 pF. coupling capacitors give just about critical i.f. coupling by connecting the coil centre taps. The plates and grids are also connected to the coil centre taps to reduce feedback, to bring the i.f. gain to the required level, to improve selectivity and to reduce i.f. detuning when the space charge is moved by the a.g.c. voltage. The manual gain control adjusts the cathode bias of the r.f. and the first two i.f. stages. A bridge circuit is used to operate the S meter from the a.g.c. controlled screen grid voltage of the third i.f. valve.

A 6BE6 product detector, which has small coupling capacitors and low ohmic grid resistors to reduce the danger of overdriving it, can be used to receive c.w. or s.s.b. The valve 9002 operates the b.f.o. One diode each of the 6AV6 rectifies i.f. to obtain audio from a.m. signals and the a.g.c. voltage for a.m. operation. Filtered a.f. from the product detector is amplified in one half of the 12AU7, transformed 1 : 3 and rectified by a Ge diode to generate an a.f. controlled a.g.c. voltage for s.s.b. and c.w. reception. Even this unrefined a.g.c. circuit works quite well and is very convenient if local and much weaker DX stations have to be copied on the same frequency in quick succession.

The triode of the 6AV6 and the 6BQ5 (EL84) perform the audio amplification. The 100K ohm resistor across the headphone connections prevents a loud d.c. discharge of the blocking capacitor and adds to the safe operation of the headphones, which are earthed with one leg. A 10 ohm resistor, or a built-in loudspeaker, is automatically switched across the output transformer when the separate loudspeaker is disconnected. This protects the transformer and retains the proper load for the final.

With the simple to use and cool running silicon diodes available, a voltage doubling power supply presents no problems. It does not take long to wind the 500 turns or so as secondary winding on a burnt out mains transformer.

THE LAYOUT OF PARTS

In the interest of short i.f. leads the components of the tuned circuits are all above the chassis and the r.f. and mixer valve had to be mounted below the chassis. The cool running mains transformer is also underneath, whilst all i.f. filters are on top along the rear of the chassis with the valves between them

The HRO dial is in the middle of the front panel. The turret, the fixed tuning parallel capacitors and the three-gang variable capacitor are so arranged that the shields are in line to be effective. The b.f.o. should be well shielded to prevent blocking of early i.f. stages, resulting in sensitivity reduction.

THE "HC" CAPACITORS

Much chassis space was saved, crowding around the 9-pin valve sockets prevented, and the climatic durability improved by using "HC" capacitors, locally manufactured as "Red Caps". This is the latest version of ceramic capacitor, available in this country for about two years.

Australia was one of the first four countries in the world to produce these components without foreign licence or technical help. The HK type ceramic contains doping oxides, which help to retain reduction in the interior of the body when, after the reduction firing process, which makes the ceramic semi-conductive, the outside skin is re-oxidised.

In the case of the 25v. type, this oxide skin, forming the dielectric, is only 0.0004" thick. A fine glaze layer of only a few millionths of an inch thickness help to improve the resistance and reliability of the dielectric. Silver electrodes fired on and soldered on leads are being used as in other ceramic capacitors. In fact one has here two capacitors in series in one piece with a common internally connected semi-conductive centre electrode.

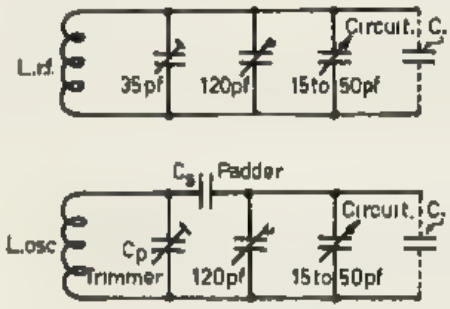
All by-pass and coupling capacitors with circuit voltages up to 25v. are of this type. A 0.01 μF. capacitor is about ¼" diameter and these little discs did not mind a 150v. test.

The name HC stands for high capacity in contrast to HK, which means high k-factor, which is a very different type of ceramic capacitor. Some countries now make HC capacitors which depend partly on the so-called barrier layer effect, but these types usually have a lower insulation resistance than those of local manufacture.

TUNING DATA

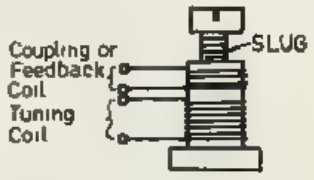
The L and C values used in the i.f. section of the receiver are shown in the circuit. The r.f. and oscillator tuning data are listed in Table 1.

The tuning data is calculated for a capacity range of 65 pF. C_{min} and 215 pF. C_{max}, ratio $C_v = 3.3$. By reducing the capacity of the trimmers slightly, which are in parallel to all coils, a capacity variation of $C_v = 3.5$ or C_{min} of 60 and C_{max} of 210 pF. results This allows for sufficient overlapping from coil range to coil range. The overlapping of the five C ranges for each coil range is obtained by using 30 pF. fixed capacity steps (e.g. 0, 30, 60, 90 and 120 pF.) and a variable air capacitor with 35 pF. variation (15 to 50 pF.).



Range	f r.f. Range Mc.	L r.f. μH.	Turns r.f.	f os. Range Mc.	L os. μH.	Turns os.	Cs Padder pF.	Cp Os. Coil pF.
1	1.7-3.06	51	71	3.575-4.935	38	61	165	22
2	3.06-5.5	15.5	40	4.935-7.375	11.5	32	300	12
3	5.5-9.87	4.7	22	7.375-11.745	3.5	17	550	6.6
4	9.87-17.8	1.42	12	11.745-19.675	1.05	10	1000	3.6
5	17.8-32	0.43	6 (8)	19.675-33.875	0.32	5 (7)	1800	2
6	32-57.2	0.13	3 (4.5)	33.875-59.075	0.097	3 (3.5)	3300	1.1

Table 1.—R.f. and Oscillator Tuning Data.



The aerial and r.f. stage coupling coils have one-quarter (range 1 and 2), one-third (range 3 and 4), and one-half (range 5 and 6) the number of turns as used for the r.f. coils of these ranges.

The oscillator feedback coils have to be so adjusted that per range at maximum capacity the oscillator still works with sufficient oscillator voltage at the mixer grid, but at the same time at minimum capacity the oscillator must not overswing and cause birdies.

(Continued on Page 17)

A 160-Metre Converter for 80-Metre Receivers*

Compact Fixed-Tuned Unit Covering the Lowest-Frequency Amateur Band

PHILIP E. HATFIELD, W9GFS

• Several current manufactured receivers as well as a good share of home-brew jobs do not include the 160 metre band. This easily-built converter unit puts a much neglected part of the Ham spectrum within the tuning range of any receiver covering the 80 metre band.

INSPECTION of the frequency range of some Amateur band receivers might indicate that there is no band lower in frequency than the 3.5 Mc. band. While it is true that there isn't **much** space at the lower frequencies, still there is considerable activity in the tiny segments of the 160 metre band shared by Amateurs and Loran.

"UP" CONVERTER

A converter can be constructed to make these receivers operate in the 160 metre band by converting the 160 metre signals up in frequency to the 3.5 Mc. band instead of down in frequency as is done in most converters. Normally, the i.f. output frequency of a converter is lower than the input frequency. This is done to utilise some of the advantages of a low i.f. frequency. However, a converter can be designed to produce beat notes higher in frequency than the input signal just as well as lower. An example is the BC348 receiver which has an i.f. frequency of 915 Kc., but includes the range of 200 to 500 Kc.

The principle of converting up in frequency was used in the converter to be described. This converter was constructed to extend the frequency range of the station receiver, but it can be used with any receiver covering the 3.5 to 4 Mc. band.

A second departure from convention in this converter is to use fixed-tuned circuits in the r.f. amplifier and mixer at the rather low frequencies involved. This would not be practical if the old 160 metre band were to be covered, but a 25-Kc. band segment can be very satisfactorily covered in this manner. (In Australia, the band is 60 Kc. wide—1800 to 1860 Kc.—Ed.)

* Reprinted from "QST," January, 1962.

The physical layout of the converter illustrated was dictated by the necessity for matching it with other plug-in converters for the receiver. In this arrangement the converter obtains filament and plate voltages through an octal plug mounted on the bottom of the converter. However, almost any chassis or box can be used for the converter, and a small power supply may be built in if no means of taking power from the receiver is available.

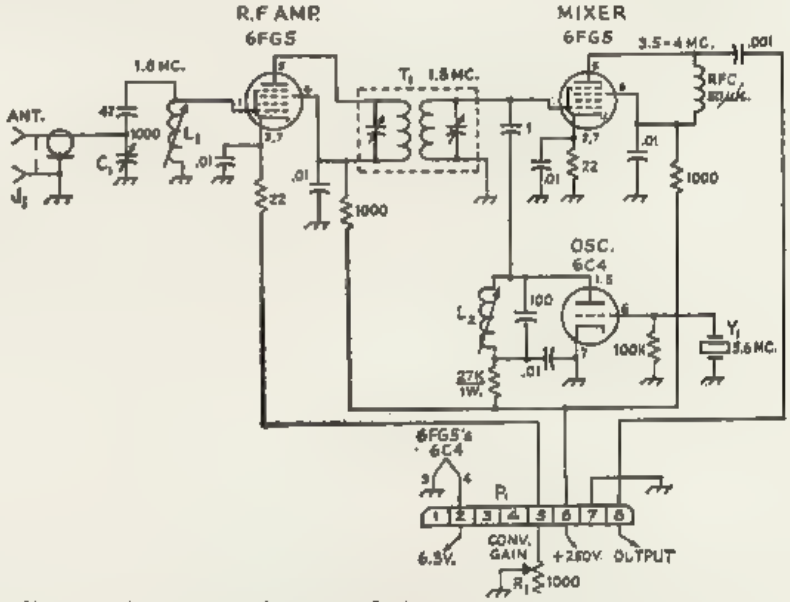
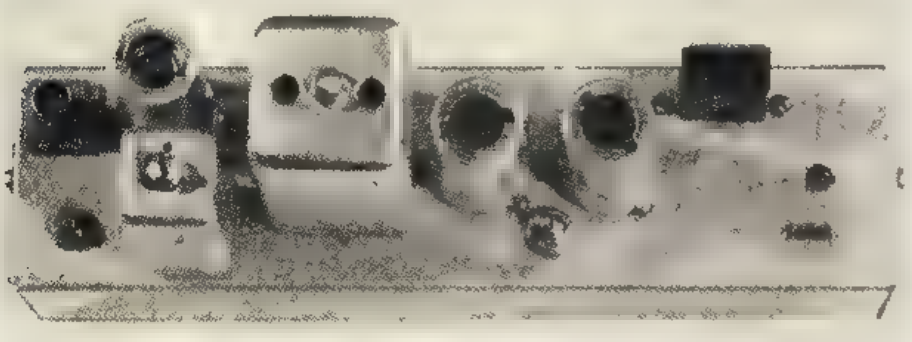


Fig. 1—Circuit of the 160 Metre Converter. Resistances are in ohms and resistors are ½ watt unless indicated otherwise. Fixed capacitors of less than 0.001 μF are mica; others are ceramic. Decimal values of capacitance are in μF.; others are in pF. except as indicated.

C1—850-1,000 pF. (approx.) compression-type trimmer.
J1—Chassis-mounting coax receptacle.
L1—Approx. 200 μH. (broadcast-band "loopstick").
L2—Approx. 8 μH.
P1—Octal chassis-mounting plug.
R1—1,000 ohm control (in receiver).
T1—1,500 Kc. mica-tuned i.f. transformer. 10 turns removed from secondary.
Y1—See text.



The 160 Metre Converter. The particular physical arrangement shown here is designed to fit into a unit-section type receiver. The "loopstick" used in the input circuit is mounted in the small can between the trimmer capacitor and the i.f. transformer which couples the r.f. stage to the mixer. Mixer and oscillator tubes, slug-tuned oscillator coil and crystal are to the right. The foundation is an 8½ x 2⅝ x 1⅝ inch interlocking type box.

TUBES

The circuit of the converter consists of an r.f. amplifier, a mixer, and a crystal-controlled oscillator. Both the r.f. amplifier and mixer tubes are 6FG5s. This relatively new General Electric tube is a "shadow-grid" beam pentode and has several advantages in Amateur usage that merit a short discussion here.

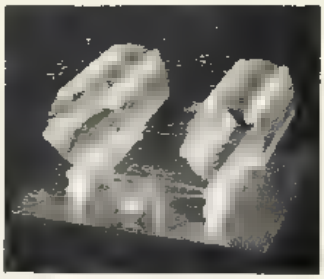
The 6FG5, unlike other pentodes, has an additional grid, placed between the control grid and the screen, and connected to the cathode. This additional grid reduces the ratio of screen to plate current and makes it practical to operate both the plate and screen at +250 volts. Use of the same voltage on plate and screen reduces the number of dropping resistors and bypass capacitors required. In addition, the transconductance of 9,500 micromhoes makes

AMERICAN "AIR DUX" AIR WOUND COILS

"T" SERIES STANDARD "AIR DUX" COILS

are constructed of tinned copper wire wound on large low loss plastic rods for the highest mechanical strength and lowest electrical losses. Fifty-five different coils are available, ranging from ¼" to 3" diameter and 4-6-8-10-16-32 turns per inch, in various wire sizes.

FREE EIGHT PAGE CATALOGUE



"AIR DUX" BALUN

Balun coils that match impedance in both transmitters and receivers, without adjustment, from 10 through 80 metres. For matching 75 ohm unbalanced to 300 ohms or 75 ohms balanced. Will easily handle outputs from transmitters with power up to 750 watts if s.w.r. is held low.

PI DUX ASSEMBLY

The 500w. Pi Dux Assembly is compact, yet conservatively rated. The high frequency coil sections are silver plated for high tank circuit efficiency. A complete technical sheet is included with each assembly.

Australian Representatives:—

TRANSTRONIC PRODUCTS

123 BALGOWLAH ROAD, FAIRLIGHT, N.S.W. Phone XJ 6181

A complete range of these Coils are also available from:—

Victoria:
J. M. MAGRATH & CO. P/L.
208 Lt. Lonsdale St., Melb'ne
Phone: 32-3731

Queensland:
C. A. PEARCE PTY. LTD.
33 Bowen Street, Brisbane
Phone: 2-8510

REVISED RANGE!

ELECTRONIC A & R EQUIPMENT

POWER TRANSFORMERS

* *New!!* **VOLTAGE DOUBLER TYPES**
* *New!!* **FULL WAVE RECTIFIER TYPES**
* *New!!* **DATA SHEET AVAILABLE**

send for your copy NOW!

POST THIS COUPON

A & R ELECTRONIC EQUIPMENT Pty. Ltd. 46 LEXTON RD., BOX HILL, VIC.

Please send me your NEW POWER TRANSFORMER Leaflet.

NAME ..... ADDRESS ..... STATE .....

the tube a better performer than many commonly used pentodes. While not of importance at 160 metres, the low screen-to-plate current ratio reduces partition noise and makes the 6FG5 attractive also at v.h.f.

CIRCUIT

The input circuit of the converter, patterned after the one used in the once popular R-9'er, was designed to match the 50-ohm link used between the receiver and an antenna tuner; a conventional inductively coupled input circuit could just as well be used. This could be done by winding a few turns of wire as a primary on the broadcast band "loopstick" used as the input-circuit inductance. Interstage coupling between the r.f. amplifier and the mixer is through a 1,500 Kc. i.f. transformer. A compression-trimmer-tuned transformer was used and no difficulty was encountered in tuning the primary to 160 metres, although turns had to be removed from the secondary coil. An r.f. choke was used in the plate circuit of the mixer for simplicity. The crystal oscillator is conventional and uses a slug-tuned coil for the tuned circuit.

Converter with bottom cover removed. The input-circuit trimmer capacitor is in the upper left-hand corner. L3 is to the right of the tie-point strip, upper centre. The power connector is set in the bottom cover.

CRYSTALS

Since it is very difficult to prevent signals at 3.5 to 4 Mc. from leaking through with such a converter arrangement, some assistance may be had from proper selection of the crystal frequency. For example, if you are interested in c.w. only, pick a crystal that will make use of the phone portion of the 3.5 to 4 Mc. band for the tunable i.f. system. In this way you will avoid calling those very weak signals that may turn out to be operating in another band. Of course, if you are interested in phone, pick a crystal frequency that puts you in the c.w. portion of the 3.5 to 4 Mc. range. In addition, a simple low-pass filter may be placed between the antenna and the converter

TWO-SEGMENT COVERAGE

If you wish to cover both segments of the 160 metre band presently available, several modifications of the converter are possible. One method would be to use replacement broadcast coils for the input and mixer circuits with a two-gang capacitor to tune both coils to the desired segment of the band. Here it might be necessary to remove a few turns from the secondaries of the coils, although if slug-tuned coils were used, sufficient range might be available. Coverage of the two segments could also be obtained by switching trimmer capacitors across the broadcast coils. In either case, it would not be necessary to switch the crystal.

The idea of converting up in frequency may be extended to even lower frequencies than was done in this 160 metre converter. For example, a converter could be designed to cover the frequencies in the vicinity of 500 Kc. to allow reception of the ship and coastal c.w. traffic. Coverage of still lower frequencies is undoubtedly possible. ●

Short Wave Receiver

(Continued from Page 13)

With range 6, difficulties of this nature may be experienced. In this case it is possible to reduce the trimmer capacity further and use only the 0, 30 and 60 pF. fixed parallel capacitor ranges.

It is also possible to shift the low capacity ranges of coil range 5 so far that the frequency band up to 40 Mc. can be covered.

The coil table shows certain turn numbers in brackets. These are the calculated values. Due to lead inductance between the coils and the capacitors, the practical turn numbers had to be reduced to be able to make use again of the slug-tuning range.

One-fifth to three-quarters the tuning coil turns are required as oscillator feedback coil turns.

OTHER VERSIONS

The beginner may plan to build the complete receiver but simplify the circuit at first. The turret may be replaced at first by plug-in coils and the r.f. stage may be left out for the time being. The crystal filter can also be omitted, simply by replacing the crystals by a small ceramic capacitor between coil centre taps, not using the bifilar wound coil. It is, of course, advisable to leave the necessary space for the future inclusion of the omitted components.

The S meter may be any milliammeter with less than 2 mA. max. current.

It should not be too difficult to modify a three-gang radio capacitor to the required capacity range. ●

HINTS AND KINKS

H.F. CRYSTAL FILTER MOUNTING

Because of the increasing popularity of h.f. crystal filters, this month's cover shows a simple, yet effective means of mounting the crystals and the torroid.

A piece of "Zephyr" board is used to mount the four crystals which are pushed through the board. The valve lugs, taken from a cheap type of a wafer octal socket, are then pushed over the crystal pins and soldered. This provides a symmetrical low-loss type of construction. The torroid is clamped to the "Zephyr" board which is mounted below the chassis on standoff mountings

Such a construction provides a very inexpensive, effective, mounting which is required to ensure that the signal travels through, and not around the filter.

If a shielded enclosure is used, then adequate space should be provided around all sides so that stray capacity is kept to the minimum.

A suitable torroid is the Mullard FX1299, wound with 26 turns of bifilar 26 gauge enamelled wire.

(Photograph of the unit is featured on the front cover.)

— . . . —

THOSE MISSING FEATURES

You probably have noticed that some monthly features of our journal are missing this issue. Unfortunately the copy for same had not arrived by the due time—hence they had to be omitted so that we could publish the magazine on time. Correspondents are reminded that copy must be received at P.O. Box 36, East Melbourne, C.2, by the 8th of the month preceding publication date.

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

Manuscripts should preferably be typewritten but if handwritten please double space the writing. Drawings will be done by "A.R." staff.

Photographs will be returned if the sender's name and address is shown on the back of each photograph submitted.

Please address all articles to the

EDITOR "A.R.,"
P.O. BOX 36,
EAST MELBOURNE, C.2,
VICTORIA.

DON'T FORGET THE SIXTH JAMBOREE-ON-THE-AIR

We would like to thank those Amateurs who have signified their intention of assisting Scout Groups to take part in the Sixth Jamboree-on-the-Air during the week-end of 19th and 20th October. We remind you that this activity, which is not a Contest, begins at 1000 hours on 19th October and will continue for 48 hours.

It's aim is to help Scouts realise the world-wide nature of their Movement, to give them an opportunity to exchange views and establish new friendships with Scouts in other States and perhaps other countries, and to introduce them to the fascinating hobby of Amateur Radio. As a result of their participation in previous years, some Scouts have joined the Ham ranks and Scout Groups have set up their own Radio Clubs.

Generally speaking, conditions in 1962 were not good owing to the sunspot cycle, which, of course, is at present at the low point of its eleven-year span. There were sporadic openings, but these were far and few between. Nevertheless, Scouts enjoyed themselves whether they talked to the Group next door, or one a thousand miles away. It is expected that the four Scout Groups with their own Amateur Stations, VK4AH and VK4OS in Queensland, VK7BS in Tasmania, and VK3AEF in Victoria, will be in contact with each other during the Jamboree week-end.

The World Scout Bureau, with headquarters in Ottawa, Canada, will operate VE3WSB again, using a.m., s.s.b., and c.w. This station will normally be sending code at ten words per minute, but will gladly speed up or slow down on request for the benefit of those Scouts working towards proficiency in their signalling tests.

We are advised that the frequencies on which the World Bureau will be operating are as follows:—

80 Metres—3790 and 3850 Kc. on s.s.b.; 3780 and 3850 Kc., a.m.

40 Metres—7190 and 7290 Kc.

20 Metres—14130 and 14310 Kc., s.s.b.; 14195 and 14210 Kc., a.m.

15 Metres—21195 and 21350 Kc.

Remember that if you have Scouts in your shack, or if you are associated with the Boy Scout Movement in any way, or have been so associated in the past, you can take part in the Jamboree. You may enter the event by calling "CQ Jamboree" or by answering a station you hear so calling.

If you require any further help or information contact your Branch Organiser, whose address appeared on page 13 of the September issue. Victorian Amateurs may get further information by calling into the Jamboree Net on 80 metres on Thursday evenings after 2030 hours.

Log sheets have been distributed to all Groups who have signified their intention of taking part, and it would be appreciated if these could be returned through the prescribed channels to the Branch Organisers before Nov. 18, to enable a report to be compiled for the World Scout Bureau.

A SPECIAL JAMBOREE MESSAGE FROM VK3WI

Rolfe W. McKellar, Chief Commissioner of the Boy Scout Association, Victorian Branch, known affectionately as "Bosun" to thousands of Victorian Scouts, will broadcast a special message from VK3WI to all Victorian Scouts during the course of the 6th Jamboree-on-the-Air.

An associate member of the W.I.A., "Bosun" is no stranger to Amateur Radio. Appointed Chief Commissioner earlier this year, he took over from Major-General R. J. J Risson, C.B., C.B.E., D.S.O., E.D. Rolfe McKellar began Scouting in 1910 in Camperdown and has progressed through the Movement serving in many important posts. He is the holder of several of Scoutings highest awards. During the war, Rolfe served as a Major in the R.A.E.M.E.

He is a man who has devoted himself wholeheartedly to the Scout Movement. Energetic, efficient, and most likeable, he stresses the significance of the Scout Movement as a means of developing the character of our youth.

"Bosun" will broadcast on 3.5, 7, 50 and 144 Mc. at 2000 hours on Saturday, 19th October, and we ask you to encourage the young Scout visitors in your shack to tune in for their Chief.

—L. D. Marmo, Public Relations Officer, Jamboree-on-the-Air, Victoria.

Technical Correspondence

OVERTONES

Editor "A.R.," Dear Sir,

Permit me to reply to VK3QV's letter in September 1963 "A.R." criticising a statement I made in a recent article "A Broad-Band, Band-switched, Crystal-Locked Converter," "A.R.," June 1963, concerning overtones.

I am afraid he did not at least pay me the compliment of carefully reading the article because in the second column on page 2 I certainly gave my reason for the statement.

No authority was given, however, as I did not think the statement was important enough to warrant it.

As some confusion seems to exist regarding the relation between overtones and harmonics, I will now quote.

"Physics for Students of Science and Engineering," by Halladay and Resnick, page 431, "The lowest frequency $\sqrt{F/u/L}$, is called the fundamental frequency f1 and the others are called overtones. Overtones whose frequencies are integral multiples of the fundamental are said to form a harmonic series. The fundamental is the first harmonic. The frequency 2f1 is the first overtone or the second harmonic, the frequency 3f1 is the second overtone or the third harmonic, and so on."

"Principles and Applications of Physics," by Blith and Elder. Same explanation on page 304.

"Modern University Physics, Part 1," by Richards, Sears, Wehr, Zemansky. Same explanation, page 227.

—A. S. Mather, VK3JZ

Editor "A.R.," Dear Sir,

Referring to David Rankin's (VK3QV) letter, published in the Technical Correspondence column of Sept. "A.R.," I think that a lack of definition of terms could have caused confusion.

The letter refers to an article by VK2JZ about crystal locked converters. Apparently the author had stated that the crystal oscillator used worked on their 2nd overtone and gave an output on a frequency approximating to three times the fundamental. David, in his letter, argued that it is impossible to excite standard cut crystals to oscillate in their 2nd overtone mode.

When I was doing University Physics, my lecturer told me that the term "overtone" referred to any signal which had a frequency higher or over the fundamental frequency, e.g. the theoretical frequencies of overtones expressed as multiples of the fundamental of an excited thin bell are of the order of 1.000, 2.928, 5.433, 8.771 . . .

But assuming a signal with no such inharmonic behaviour, the first multiple of the fundamental is known as the first overtone; the second multiple, the second overtone.

However, using the "harmonic notation," the fundamental is known as the first harmonic, the first multiple, the second harmonic.

Thus the second overtone is synonymous with the third harmonic.

Now it is more common in the radio world to accept the first overtone and first harmonic (i.e. the fundamental is the first overtone as well as first harmonic). Assuming that this system is the one known and used by David VK3QV and that the system as outlined above is the one that the author of the original article had in mind when he put pen to paper, this accounts for the confusion.

While I make no claims to the validity of either of the above conventions, I do make a plea for a definition of terms in our hobby to save words (and tempers sometimes?) when the fault lies, not in technical inaccuracy, but the fact that the participants of a discussion start from different points as far as terms are concerned.

—John Ingham, VK5ZDZ.

Editor "A.R.," Dear Sir,

I agree with John VK5ZDZ that definition of terms probably gives rise to the differences in terminology for overtone operation of quartz crystals. My purpose in quoting two classic texts on quartz crystals in my previous letter was to illustrate that the commonly accepted method of reference was that that frequency approx. n times the fundamental was the nth overtone mode of operation. No doubt reasons could be produced to support the "VK2JZ notation" or others and if the inharmonic modes present in AT or BT cut crystals were considered the subject, would become almost impossibly complex. However, since there has been agreement on terminology amongst crystal manufacturers and users for many years, there seems no reason to introduce another system. More confusion than enough has arisen from such terms as "conventional current" and "electron current", let us not make matters worse by departing from generally accepted terms unless there are excellent reasons for so doing.

—David Rankin, VK3QV.

VK5WI Portable at John Martins

In mid July, John Martins, one of Adelaide's largest stores, asked the South Australian Division of the W.I.A. if they could install an Amateur Station and display stand at their Audio Exhibition in their new auditorium. Bob Murphy, VK5ZDX, was appointed co-ordinator and offers of equipment were made by VK5KK and VK5ZDZ.

With the question of transmitters and receivers solved, stand and antennae were attacked. John Martins' display staff made up all the backdrops and notices, and gave us a free hand to use the roof area for the antennae

As multi-band operation was desired, three separate antennae were erected. These were ground planes for 6 and 2 metres and an off-centre fed dipole for 80 through 10 metres. This latter antenna was fed with 300 ohm open wire which was coupled to the coax cable with a ferrite core balun. The ground planes were mounted on water-pipe masts, clamped to the fourth floor lift house stairs, while the long wire was strung between a flagpole on this lift house roof and the roof of the seventh floor lift house. The coax feeders for all antennae were run down the service well to the second floor auditorium

The transmitting and receiving gear was set up at the back of the stand, which was about 20 x 15 ft. Various items of equipment were displayed in showcases around the stand and a complete closed-circuit television installation, exhibited by VK5ZEY, took up the balance of the space.

Installation of equipment was carried out on Saturday, 3rd August, and all was ready for the opening on Monday, the 5th. During the next two weeks 106 contacts were made from "VK5WI Portable at John Martins". Operating times were limited to 1230 to 1330 and 1630 to 1730, due to the shortage of day-time operators.

The interest shown in our stand was so great that John Martins gave Doug. VK5KK permission to operate VK5WI in the R.D. Contest from the auditorium. As the Exhibition finished on Saturday, 17th, there was a certain amount of pandemonium after 1130 to get things ship-shape in time for the start of the Contest at 1730. The 2 metre dipole was pulled down and replaced by a 15 metre dipole, which for some minutes looked likely to return to earth Some speedy guying saved the day.

The only modification to the transmitter was to install a fan to keep the final bottle cool. At 1730 S.A.S.T., VK5WI hit the R.D Contest with a roar heard far and wide.

Doug. was the only operator and except for a short snooze between 0400 and 0500 on Sunday, operated continuously from 1730 Saturday, till 1630 Sunday. (By 1630 there were no stations left on the air that VK5WI had not contacted.) Assisting Doug. with the logging were John VK5LV, Graham VK5ZGW and Geoff VK5ZCQ, while Doug's. YL (Beverley) kept up the nourishment with black coffee and biscuits.

At about 0700 Sunday, Beverley went into action with a fry-pan to produce bacon and eggs with mushrooms. These had the desired effect and Doug. really started to make things hum. Great was the consternation when, after sending a number in the 180s, VK6WI received one in the 290s from VK5WI. The shocked snarl had to be heard to be believed.

★

VK5WI's Stand at the Audio Exhibition in Adelaide

★

With the score at 404 contacts, the station closed down, and when Bob VK5ZDX arrived at 1700, dismantling commenced. By the time the transmitter rack and the receiver had been loaded into John's 'ute and the cooking utensils, cables, sleeping bags, etc., had been forced into either John's 'ute or Doug's. car, it was 2000 Sunday and a very weary mob of R.D. Contesters left the building.

The Exhibition created considerable interest among the general public, and the front of the stand was rarely deserted. A short pamphlet describing Amateur Radio and the W.I.A. was freely distributed, and whether any new members result or not, the favourable publicity still made the effort worth while.

The Divisional Council thanks all those who helped to make the Exhibition a success, in particular Bob VK5ZDX, as co-ordinator and Doug. VK5KK for the use of his transmitter and receiver and for operating them as VK5WI in the R.D. Contest.

(Note to other Divisions: VK5 is still the Division that gets things done!)

—G. M. Taylor, VK5ZCQ.

TRANSISTORS

Japanese

Type—

2S31,	similar	OC45, 2N410, etc.
2SB54,	„	OC75, 2N217, „
2SB74,	„	OC170, 2N1637, „
2SB75,	„	OC72, 2N174, „

10/- each + S.T 25% Post Free.

SILICON DIODES

Type STV-4, 400 P.I.V.

Continuous D.C. Current: Capacitive load 800 mA., resistive load 1 amp. Max. repetitive peak current 5 amps. Max. reverse current 500 μA. at 100°C. Max. forward voltage drop at full load current 1.5 volts.

6/3 each or **70/- dozen**
+ S.T. 25% + Pack and Post 6d.

TRANSISTOR PUSH-PULL AUDIO AMPLIFIERS

Five Transistors. Requires only 9v. bat. and 10K pot., and connection to a tuner, etc. Speaker required, 8 to 16 ohms V.C.

£5 + S.T. 25%
+ Pack and Post 1/-.

WARBURTON FRANKI

Where good value and good quality go hand in hand

SOLDERING IRONS

Australian Made SUPERIOR

Type AOD, 30 Watts, two bits supplied 3/16" and 7/16". Complete with flex and plug.

28/- each S.T.E.
+ Pack and Post 2/-.

EXTENSION SPEAKERS

Round Metal Case, 9¾" diameter x 2½" deep. Impedance 16 ohms—80 to 9,000 c p.s.

65/- each + S.T. 25%
+ Pack and Post 2/3.

TRANSISTOR RADIO TUNERS

Requires only 9 volt battery and connection to an Audio Amplifier. Covers Australian B.C. band.

£5/12/- + S.T. 25%
+ Pack and Post 1/-.

SIGNAL GENERATORS

LEADER—Combines Quality with Low Price

LSG10

Frequency Range: 120 Kc. to 260 Mc. (six bands) and Calibrated Harmonics 120 to 260 Mc.
R.F. Output: Over 100,000 Microvolts.
R.F. Control: Variable with two taps.
Modulation Frequency: 400 c.p.s.
A.F. Output: 2-3 Volts.
A.F. Input: Approximately 4 Volts.
Valves Used: one 12BH7 and one 6AR5.
Size: 6½" x 10" x 4½". Weight 6 lbs.

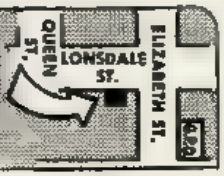
Price £12/16/- + S.T. 12½%
Pack and Post: Victoria 5/-, Other States 7/6.

LSG11

Frequency Range: 120 Kc. to 130 Mc. (fundamental).
Calibrated Harmonics: 120 to 390 Mc.
R.F. Output: 0 to 100,000 uV. (adjustable).
Mod. Freq.: 400 and 1,000 c.p.s. (adjustable).
Crystal Oscillator: 1 Mc. to 16 Mc. (Crystal not supplied).
Valves Used: One 12BH7 and one 6AR5.
Size: 7½" x 11" x 4½". Weight 6 lbs.

Price £15/-/- + S.T. 12½%
Pack and Post: Victoria 5/-, Other States 7/6.

WARBURTON FRANKI
359 LONSDALE ST., MELBOURNE — MU 8351



- TRADE ALSO SUPPLIED
- OPEN SAT. MORNING

Please include postage or freight with all orders.

D X

VP4, OA4, BV, ZM7, 7G1, FP, AC5, MP4, ZC6, TY2

Sub Editor: ALAN SHAWSMITH, VK4SS (Phone 4-6526, 7 a.m.-4 p.m.)
35 Whynot Street, West End, Brisbane, Qld
ADDRESS CORRESPONDENCE FOR THIS PAGE DIRECT TO THE SUB EDITOR

Conditions at the time of writing this have not improved as much as hoped, with the coming of Spring. However, there is always the odd rare prefix audible, to hold the interest. 21 Mc. is predicted to produce good skip signals this Summer.

NOTES AND NEWS

JZ0HW from Sentani, West Irian, is active, evenings and mornings, on 14030 Kc. (It is not acceptable for D.X.C.C. status, since the creation of Indonesian country of West Irian.)

Montserrat: VP2NI is active on 20 mx s.s.b. Also supposed to be on c.w. QSLs go to K8ONV

Aland Island, OK5VD/0 is reported about 14021 Kc. c.w.

Amsterdam Island FB8ZZ is active again on 14030 Kc., 1130-1200z. QSL via Box 587, Tannarive, Malagasy Republic.

St. Helena, ZD7BW is now QRV and reported worked on 20 mx s.s.b.

Bahrain Island: Ian MP4BBW is back again and active on 20 mx s.s.b., but with weak signals due to antenna problem, which he hopes to solve shortly

Cape Verde Islands. CR4: The HB9TL s.s.b. rig will stop off in CR4 land for a session by CR7CI, en route from CT1 to CR7.

Anguilla: Rumours of two DX-peditions here this fall, possibly to coincide with the "CQ" DX Contests. No details yet. VP2KP/A cards are out.

Torishima Island: Due on now as JA1BRK/T. This is a small island 200 miles north of the Bonins. It will not count as a new one for D.X.C.C.

Abudhabi MP4TAD can be reached with s.b. on 14 Mc. Heard 5/8 about 14300. Abudhabi counts as Trucial Oman for D.X.C.C.

VQ8s. Raf and Harvey are going by boat to the VQ8s and Kure Muria in December.

Easter Island: Advance information has it that WA2KBH and possibly WA2WUV will go to Easter Island in mid or late January for 7-10 days with 100v, 75A4 and possibly a KWM-2.

Liechenstein Active on low end of 20 mx by several stations.

KC6KR is active from the Western Carolines. KC6BO in Palau is also QRV on both 7 and 14 Mc. c.w low end. Also 3.5 Mc. 1000z and 21 Mc. 0200z.

TU8AU will be active for two years QTH Abidjan. QSL to Embassy, Abidgan, Ivory Coast. Mode, s.s.b., 14 Mc.

Operation is expected again from The Kure Muria Is. The VS9 boys are planning another expedition late Sept. or early October

Carrincou Is.: VP2CC will not count as a new country. QSL, Box 6068, Flint 6, Michigan.

TI2FH is a regular on 21 Mc. around 0200z; mode A1.

As I write this word has come to hand that gear has reached Christmas Is., Indian Ocean. Unofficially this is Hammurlund equipment, so soon things should be humming from this rare spot. VK9DR is on the air but does not pursue DX purposefully enough to satisfy the hounds.

(Much of the above by courtesy K4IIF, Ed. Florida DX-er.)

ACTIVITIES

Ken VK3TL says conditions poor, but worked these: 14 Mc. c.w.: AC5A/4, HK4DP, HC1DC, EA4GZ, XE2FL, XE2GP and Europeans. 40 mx c.w.: AC4A, DU8RP. Best QSLs for the month were: VQ2WR, CN8FE, YS1O, OZ5BW, EP2RC, ZB2I, 5B4FB, VQ4ET, VQ4ERR, CR5AA, XE2CW, 5A1TW, M1MV, FR7ZC/J, ET3JK, LZ1KSP, PY1BLT, DU8RP. (Congrats, Ken, on VK/001 on 7 Mc. for R.S.G.B. Contest.)

Frank VK2QL reports conditions very quiet but QSO'd these on c.w. 14 Mc.: AC5A/4, AP5JA, VK9DR (Xmas Is.), JA1BRK/JA, KP6AZ. 7 Mc.: VP2MM, AC5A/4, FU8AG, CP5EZ, TI2PZ. QSLs recd. were HL9KH, CP2CN, VQ8BT, ZL4JF, ZL1ABZ, FR7ZC/J, VP7NT, ZS1XR, HB4PB, VQ1ET, UF6FB, and HM4AQ.

Other contributors to "Activities" report bands so dull there is little worth listing. No report from Eric, BERS195 this month, so conditions must be poor.

ADDRESSES

VP2CC C—Via W8EWS (W6JWD).
HI8MMN—Via WA6DAJ.
HK9LX—Via HK3LX.
AP2AR—Via W8QWI.
ZB1BX -Via W2CTN.
VR4CU—Henry Radio, 11240 Olympic Blvd., Los Angeles 64, Calif.
9A1TA1—Via W4VPD.
VQ8BFA—Via G8KS.
PX1IK—Via USKA.

SUMMARY

The A.R.R.L. has announced the new country criteria, as promised. It is now tougher than ever, and may make VQ8BFA from Agalegas count as another VQ8/9 that already exists. A copy of the new criteria will be in this bulletin. Also please note the new A.R.R.L. address. It is 225 Main St., Newington 11, Connecticut. Lastly, A.R.R.L. has issued a revised country listing and application sheets to be made out, whenever new ones are submitted for credit. It is really simple to use, and I'm sure it will be helpful to us all (except the honor roll guys).

The A.R.R.L. Listing is as follows:—

1. **Government Administration.** An area by reason of government, or a distinctively separate administration, constitutes a separate country.
2. **Separation By Water:** An island, or a group of islands, not having its own government or distinctively separate administration, is considered as a separate entity under the following conditions:
   a. Islands situated off shore from their governing or administrative area, must be geographically separated by a minimum of 225 miles of open water. This point is concerned with islands off shore from the **mainland only.** This point is not concerned with islands which are part of an island group, or are geographically located adjacent to an island group.
   b. Islands forming part of an island group, or which are geographically located adjacent to an island, or island group, which have a common government or administration, will be considered as separate entities, provided there is at least 500 miles of open water separation between the two areas in question.
3. **Separation By Foreign Land.** In the case of a country, such as that covered by Point 1, which has a common government or administration but which is geographically separated by land, which is foreign to that country, if there is a complete separation of the country in question, by a minimum of 75 miles of foreign land, the country is considered as two separate entities. This 75 miles of land is a requirement which is applicable to land areas only. In cases of areas made up of a chain of islands, there is no minimum requirement concerned with the separation by foreign land.

(The above, by courtesy of Joe WA6TGY, Editor N.C.D.X.C.)

A club brought into being to perpetuate Amateur Radio's highest endeavour, is the newly-formed "S.s.b'ers International". Its motto is: "Dedicated to building of friendship among all the people of the earth through Amateur Radio, and to enjoy ourselves in the process." This idealism is not beyond attainment, provided dissention and small talk does not clog its ranks. Listen to 14.333 for what promises to be Amateur Radio's most futuristic and biggest ever club, created individually.

73, Al VK4SS.

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. New members and those whose totals have been amended will also be shown.

PHONE

Call	Cer No.	C'ntries	Call	Cer. No.	C'ntries
VK6RU	2	286	VK3WL	14	211
VK6MK	43	232	VK3ATN	26	204
VK5AB	45	275	VK4HR	12	192
VK3AHO	51	269	VK2JZ	61	187
VK4FJ	21	255	VK4RW	23	186
VK6KW	4	211	VK3GB	50	183

Amendment:
VK3TL 62 115

C.W.

Call	Cer No.	C'ntries	Call	Cer. No.	C'ntries
VK3KB	10	312	VK6RU	18	244
VK3CX	25	296	VK3RP	56	229
VK4FJ	29	232	VK3FH	15	226
VK2QL	5	279	VK3HZ	5	223
VK3NC	19	266	VK5RX	23	220
VK2AGH	71	247	VK3YD	27	220

Amendments:
VK3ARX 66 215 VK3TL 78 138
VK3AX 68 141

OPEN

Call	Cer. No.	C'ntries	Call	Cer. No.	C'ntries
VK2ACX	6	300	VK3HG	3	289
VK6RU	5	294	VK3NC	77	269
VK4FJ	32	290	VK3JA	43	252
VK6MK	74	284	VK4HR	7	233
VK2AGH	83	280	VK3HZ	4	231
VK3AHO	76	272	VK3WL	45	225

Amendment:
VK3TL 85 172

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publishers.

YOUTH RADIO CLUBS

Editor "A.R.," Dear Sir,

I read Al Rechner's comments on the Youth Radio Club with, as far as possible, a neutral attitude, however I feel that some further comment could be made.

Whilst in complete agreement that education is most important, is not a good clean hobby equally important? Radio is not a hobby which can be treated lightly, time must be spent on it, and by fulfilling this requirement it is not only teaching them the basis of a good trade, but keeping their minds occupied and away from the many temptations which confront youth today.

Over the past 18 months I have been actively assisting our local Life Boy and Boys' Brigade teams in morse and radio instruction, and it is very rewarding to myself and other leaders to see how keen these chaps are in their work—and their schooling is not suffering. When their schooling is finished, those anxious to become Hams will be handed over to Don VK2RS and the boys of the Albury Radio Club and have a good background to work on.

In the meantime, I can only convey my good wishes and congratulations to the W.I.A. for their interest in the work, and trust it will continue.

—Don Grantley, WIA-L2022.

Editor "A.R.," Dear Sir,

Al Rechner, in his letter to the Editor in the Sept. issue of "A.R." has made some careful observations on the training of youth in radio after some years in the organisation of youth radio clubs. I, too, have been in a position to make observations but from a different "angle", being a member of two radio clubs at tertiary level, and my conclusions correspond pretty well with those reached by Al.

Firstly, about a year ago a count was taken of the members of the Radio Club of the University of Adelaide and it was found that the subject failure rate of the members was about twice that of non-members who were doing the same course.

When I was going through high school I was not a member of any club but my experience with my hobby during that time, and subsequently, lead me to two conclusions:

Ham Radio is definitely a distraction to the student,

And although the method of thinking that Amateur Radio encourages is beneficial to the more elementary science subjects (inter physics and chemistry), the more advanced student with a "Ham fix" is at a serious disadvantage.

Dealing with them one at a time. Most Hams like to tinker with some little project and I found that although my station may be in good working order, I would always be thinking of little improvements, a noise limiter, a g.d.o., etc., as well as the obvious temptation of leaving the studies for a band opening.

One solution to this is what Alf VK5LA (now B.Tech. Electronics) did which was to disable transmitter and receiver during term time, pack it in a box and forget it!

This is not really the answer as everybody needs relaxation some time and I think you will agree Ham Radio provides this for young and old. It probably boils down to a matter of will-power. I do not know if it is a coincidence, but all the highly intelligent students I know seem to be able to switch their minds on and off as far as radio is concerned and really concentrate on studies when required. It's a pity that we weak-willed wretches are usually less brainy and need the swatting even more and probably do less of it!

To the second point. This is more directed to the student who is going on to higher studies. Nearly every science subject can be split into two parts—qualitative and quantitative. Ham Radio and the elementary science subjects are mainly qualitative—i.e. descriptive. Thus a lad who becomes interested in radio is likely to improve his school work because he gets into a certain way of thinking. But as he proceeds the subjects get more quantitative or mathematical until they become virtually applied mathematics and so the student with a "Ham fix" will have to adjust himself radically if he is to have any chance of success.

My suggestion then, if we must have youth radio training, is to raise the standard of electronics taught from the word go. For example it is impossible to understand impedance without a knowledge of complex numbers, which is not taught until Leaving Honours. And yet subjects like complex notation and calculus are not difficult concepts to grasp but a small knowledge of these is of much greater use than the horde of geometry that Intermediate students get thrust down their throats.

Very little is taught in schools about electronics and if mathematics is the language of the scientist, electronics are his modern day tools. I therefore think that more good would be done by enlarging the electronics in say the Physics courses, modifying the Maths. syllabus and teaching a more mathematical electronics course right from the word "go". This way, I feel that a more broad education in electronics (as opposed to radio) can be given, it can be better controlled as well as setting the stage for higher study, and providing a solid foundation for the lad who takes a special interest and decides to make radio his hobby.

I have had personal contact with the above problems with my own studies and those of my friends, and I assure you that these problems are very real. I am now doing a course in Communication Engineering with a chap with no electronics experience at all, but a good mathematical background, and unprejudiced by preconceived concepts he is near the top of the class above the Radio Hams.

The whole of youth radio training is extremely complex and my admiration goes out to all those chaps who do give up their time to help the young. This question is not one between action and lack of action, but one of a choice between different plans of action and it is only by hearing from those who have had some experience in the field that the powers that be can judge which is the best plan of action. So comments, please, on this important phase of our hobby!

—John Ingham, VK5ZDZ.

Editor "A.R.," Dear Sir,

Al Rechner (VK5ZCR) is undoubtedly correct in one of his points ("A.R." Sept.)—that the education of our children is of critical importance. I can assure him, however, that his fear of harmful effects from the fascination of Amateur Radio is completely contradicted by the facts.

Just as Al did, I must mention one fact about myself as part of the argument. I am in charge of the Maths. Department of a large high school and so not only do I closely watch the daily studies and home-work in that subject, but as part of the administration I am in touch with all the work of the school. After 20 years of helping boys in secondary schools, develop an interest in Radio, I am sure that connecting an interest in radio with lack of success in studies is as unreal as blaming the Wright Brothers for the bombing of London. All my experience shows just the reverse of what Al fears. In nearly every case, an intense interest in radio leads to obviously improved study in Science and Maths., and also a better attitude in other subjects.

An unbalanced interest in anything at all can be a source of trouble. Parents may have to deal with sons who are fanatics about girls, money, ten-pin bowling, milk-bar gangs, cars, liquor, etc., etc. A boy who is unbalanced enough to do nothing but sit with headphones glued to his ears is doing far less harm than one who goes to excess on girls, etc. Usually he is easily encouraged to improve his knowledge. This, of course, should be one of the main aims of Youth Radio Clubs—and parents.

Al VK5ZCR says, "They won't be able to make a living out of it." You have a narrow view there, Al. It is true that very few will make a living out of Amateur Radio itself, but that is only a fraction of the story. A basic training in Electronics is a wonderful job preparation. No field of work possibilities is expanding as rapidly as Electronics in general. Every industry uses electronic aids, but even if you think only of radio and t.v. there are plenty of opportunities. One of our Y.R.C. boys of last year went straight into 2CA here as a trainee technician and even as early in the scheme as this, there are many instances of boys getting good jobs because of their basic Y.R.C. training.

I must end up with the most important point of all. We don't, as yet, have a fraction of the juvenile delinquency seen in most similar countries. We could have a wave of it. Nobody knows the full solution of this problem, but a challenging absorbing hobby such as Radio is at least part of the answer and contrary to what Al fears, it can certainly be controlled to do nothing but good.

—Ken Mattei, VK1KM.

S W L

OH0, KL7, ZD8, ON4, LZ, FF8, VP8, XW8, 5H3, W0

Sub Editor: J. M. (Mac) HILLIARD, WIA-L3074
57 Gardenia Street, Blackburn, Victoria

ADDRESS CORRESPONDENCE FOR THIS PAGE DIRECT TO THE SUB EDITOR

Several years ago we had two awards approved by Council, but so far we have not heard if anyone has gained one of these awards. Of course the D.X.C.C. award at the moment would only be available to the top two members on the DX ladder Anyway, just to refresh your minds, and to inform our new members, the two awards are:

The D.X.C.C. which is awarded on confirmation of having QSLs from 100 countries on the Ham bands. All cards must conform to D.X.C.C. requirements, that is, all cards must show the following details Date, time, band, emission, and either your WIA-L number or your full name.

The Heard All VK award requirements are: QSLs from VK1 to VK0, any VK9 and any VK0 area.

Well now who is going to be first to take off the H.A.V.K. award? These awards were designed to encourage you in our hobby and we hope that it won't be too long before we see some of these awards going off.

Well another R.D. Contest has come and gone. And it will be interesting to hear how you all fared in it. My spies tell me that several young members were at their receivers for almost the whole 24 hours. Bet there were some sleepy heads by Sunday night. Still as long as you had a good time that's the main thing.

DXers please note that 7X2 is the new call for Algeria. And 6Y is now Jamaica. ST2AR is active from Sudan on s.s.b. at 14110 Kc. CE0AB is now active from Easter Island and he operates around 14040 Kc. Seven Hams in one family, how's that for a record? Where? In W land. The youngest Ham in the family is 9 years old.

VICTORIA

The annual meeting of the Group was held in August, but as your scribe was on holidays, you will have to wait until next month as to the result of the election of office-bearers plus any other news from the meeting.

Greg L3138 was very active in the R.D. Contest and my spies informed me that he may be one of the top scorers; good luck to you Greg. Maurie L3055 had rx trouble during the Contest, however he still managed to bag a few hundred points for VK3. He has very little time for DXing these days, due to studies, etc., but still manages to extract some r.f. off his aerials

The news from the local front is very scarce at this time. So don't grumble about the local notes being shorter than usual. Your scribe hopes to get a converter going on 144 Mc. in the next couple of months, plus a 10 el. yagi. One QSL to hand this month, from 6O1WF

Eric L3042 has moved over to VK5 for a little while. Hope you enjoy your sojourn Eric and come back all the better for your trip. By the way, boys, Eric was in the R.D. for as much time as he could afford.

Bob L3078 is going along very nicely on the v.h.f. bands and certainly does not miss much, except that exceptional opening on 144 Mc. to Adelaide recently. Believe that this was the first time that the band has seen contacts from Melbourne to Adelaide proper; bad luck Bob. Still you will no doubt make up for it in the warmer months. And who knows, we may get another interstate opening on Sporadic E this season. But whatever happens, I think 50 Mc. will be very good again this year

Craig Cook has been doing a good job of the weekly notes for 3WI, and don't forget, if you have any news at all, send it in by all means. Remember it's up to us all, if we want the Group to go ahead.

Neil L3104 is working on his new v.h.f. set-up and from what I hear it sounds like he will soon have a very nice set-up. Always pleased to hear from you any time, Neil. At the moment, in between school and constructing gear, Neil is swatting for the Jan. exam. for the L.A.O.C.P., good luck to you Neil.

NEW SOUTH WALES

Our old buddy, Chas L2211, has recently completed the pre-amp. that he has had his eyes on for a while. We will be interested to hear of your results Chas. At the moment, Chas is a bit browned off as regards listening on the bands. But is expecting that the old interest will liven up again as the warmer weather comes around. I bet that once the 50 Mc. band livens up again, that our dial twisting friend will once more be at the helm.

What has become of Don L2022? Last time your scribe heard of Don, he was getting ready to depart to VK4 for a holiday. If you happen to read this Don old boy, we would very much like to hear from you again when you have a moment to spare.

Chas L2211 reports: Once again it is my pleasure to report the doings in VK2. Not a great deal of activity, but with the warmer weather ahead, we hope to see or hear from more members of our Group.

Quite a good roll up at our last meeting. Two new members joined the ranks, L3262 Tom Vaughan and L2283 Bob Mackintosh. We extend a hearty welcome to you both. Our thanks go to Ted L2249 for bringing along his projector and coloured slides of the Snowy project; to Barney L2201 for making possible the transistor replacement slide reels, which he gave to each member at the meeting; and to Norm 2AAV for his talk on Selectivity in Receivers. So chaps come along and enjoy as well as learn at our meetings.

Members are asked to send mail to the VK2 S.w.l. Secretary, Tom Harding, 33 Waratah Rd., Berowa, Sydney. This will speed up replies and save Tom a lot of travelling from his QTH, as he is a long way from headquarters.

I have received from Holland a booklet entitled "A Lot Depends On Your Aerial." It consists of eight pages of very interesting information for those in doubt on the subject. Write to Technical Dept., Radio Netherlands, Box 222, Hilversum, Holland, if you would like a copy.

WESTERN AUSTRALIA

Peter L3021 has as usual been very active at his receiver, and was very thrilled recently when he logged AC5A on 7 Mc. c.w. Nice going Peter, looks like we phone boys will have to brush up on our code.

Just before the R.D. Contest Peter's rx decided to play up on him. We hope that you were able to rectify the fault in time Pete. During the W.A.E. Contest, Peter stayed up all night and said that the band was excellent with loads of Europeans on 7 Mc. c.w. At about 4.30 a.m. he at last decided to close the eyelids for a while.

Fine work old boy, and the way you are going you will soon be up to some of the leaders on the DX ladder Thank you for your interesting letter Peter, and look forward to hearing from you again next month. Beams like a waste of time trying to get anyone else to write to us from VK6 land.

73, Mac Hilliard.

DX LADDER

	Countries		Zns.		s.s.b.		W
	Conf.	Hrd.	Conf.	Hrd.			Stat.
E. Trebilcock	281	289	40	—	—		50
D. Grantley	113	259	38	20	104		36
A. Westcott	93	189	31	8	107		11
M. Hilliard	80	231	33	28	160		18
M. Cox	75	233	28	40	150		18
P. Drew	66	199	27	27	117		13
C. Abernethy	56	96	8	—	—		14
N. Harrison	44	119	28	4	30		35
I. Thomas	41	189	30	16	97		14
G. Earl	18	114	13	7	69		—
D. Coggins	10	93	7	3	60		14

YOUTH RADIO CLUBS

One of the stalwarts of Port Pirie (it's in South Australia) called on me, VK5EQ, Bert Hollebon, and we spent a very pleasant evening. The organisation of the Y.R.C. affairs in Port Pirie is obviously top stuff and the results should follow. They have the active support of all the schools in town and they even look after one keen young man marooned 150 miles away in the outback.

Ken Matchett's excellent Newsletter No. 3 (VK3) to hand. This is one of the Division activities that links Y.R.C. together and encourages club leaders to battle on. As is natural to one who knows schools and values education, Ken gives some good advice about the importance of yearly school examinations "Develop your hobby of radio and actively engage in it in your leisure hours, but do not let it prejudice your success at school. Let it augment your school studies, not hinder them."

Additions to the club list in VK3 are (club leaders in brackets): Christian Bros. Juniorate, Bundoora (Mr. R. Williams); Greythorn High, Nth. Balwyn (Mr. P. Boa); Australian Postal Institute, Hawthorn (Mr. R. Everett); Geelong Grammar, Corio (Mr. R. Maddever); Korumburra High (Mr. W Miles); and Benalla Tech. (Mr. K. Cree). Would all local Amateurs please help? Another thought: I can't possibly imagine so many earnest teachers helping boys to develop something which could harm their studies.

Club News: Secretary Chris Doig, of Collingwood Tech., reports that the club meets every Monday between 3.30 p.m. and 4.0 p.m., Juniors under Mr. Aked and Seniors under Harry Major. Chris says, "In the first year, we study radio symbols and elementary circuits, and in the second year more advanced circuits. We are doing practical work on radio sets brought along by our members. We would be pleased to receive any old radio sets or parts to help us in assembling small sets." Good secretarial work, Chris.

Now comes a paragraph I would have put at the beginning, except that it might sound like trumpets blowing. Anyway, I'm already proud of the fine ability shown by George Branstowski (VK1GB), still a pupil at Lyneham High, who passed A.O.C.P. fully at 15 years 1 month. Now we have received the wonderful news that another pupil at Lyneham, Roger Davis, has fully passed A.O.C.P. and will soon be VK1RD. Roger was aged 15 years 9 months when he passed. He goes on the air about the time you receive this copy, so please answer his CQ and help him along. He is restricting activity until after his yearly exams.

I wish I could send this next paragraph to all Divisional Councils. The subject is the kind of help a Division can give to a club leader. I have had another newsy letter from Brian Burton (VK2AUN, ex-VK1KK), who started a Y.R.C. at Cranbrook School. Thanks to the organising of Rex VK2YA and the backing of VK2 Division, Brian has "enough equipment for quite a decent little station—Philips No. 4 receiver, an AT5, No. 11, and a 532." Brian has antenna location trouble however. "The school is built into the side of a hill, with the science block on the lowest level. There are too many trees around, also, and the combinations makes aerials too well screened and erection a hazardous business. We have our call sign now—VK2AAO—and will be looking for contacts each dinner time and after school some afternoons."

Random news from near and far. Can anyone help to form a new club at Birrong High? An anxious group has the approval of the Headmaster, but no teacher to help. . . . Efforts are being made to help form a Y.R.C. at Abbotsleigh College (Wahroonga, Sydney), a famous school for girls. This could be the third such, after VK3AYL at Melbourne C. of E. Girls' Grammar and St. Anne's (Sale) . . . Hurstville Evening College (Sydney) Radio Club had good results at Elementary Certificate exams. Two classes in Radio are being established next term. Mr. John Nixon is instructor now but more instructors and equipment are needed. . . . Mr. T. D. O'Connor, of Ryde (N.S.W.) has donated £2. His son, Brian, still at Primary School, is a non-club member and father sees the value of this fine hobby

Help wanted at Meadowbank High (Sydney) where there is another anxious group but no qualified teacher. . . . Culcairn Central School (N.S.W.) has registered, fortunately, with two teachers who are radio addicts. However, there is the usual urgent call for components and magazines. . . . 73, Ken VK1KM.

FEDERAL AND DIVISIONAL MONTHLY NEWS REPORTS

(SEND CORRESPONDENCE DIRECT TO DIVISIONAL REPORTER NAMED AT PARA. END)

NEW SOUTH WALES

HUNTER BRANCH

At the Sept. meeting of the Branch, held in the University College, two visiting lecturers from Gosford, Major 2RU and Lindsay 2ON, took the floor while thirty-two members and visitors learned some of the mysteries of s.s.b. and rx selectivity curves. Major had on display a two-valve s.s.b. tx associated with a Command Q5'er to make a very small and efficient transceiver for s.s.b. Lindsay displayed the response curves of the variable selectivity Drake rx on an Amateur built oscilloscope using a home-brew wobbulator. All this proved of great interest to the members present and at the conclusion of the meeting a vote of thanks to the lecturers, moved by Les 2RJ, was carried by acclamation.

It was pleasing to see in the audience two other visitors from Gosford, Fred 2ALA and Reg 2AI. Fred being able to assist by display of a profject converter and Reg having tucked under his arm a Collins transceiver, which also had its picture played on the green screen. Bill 2CW was also there so this could mean that any year now we may hear him on the air.

Leo 2QB was to have described his g.d.o. at the next do-it-yourself night but enquiries show that it resides in a drawer at his house and he's forgotten which one it is. Frank 2APO has had another aerial triumph in the shape of a collinear beam for 20 mx. He manages to work all the DX about the place. In far off G land waits Lionel 2CS while the fog swirls about his feet and he dreams of sunny Australia. This lucky man was fortunate to win a prize at the R.S.G.B. meeting. Sherwood 2AJF, our happy t.v. mechanic from Cessnock, went hunting a tx the other day. It was his own AT21 though and the reason was all due to the over zealous use of his side cutters.

Nev Woods has completed his converter, using hybrid valves and it is performing really well, although there is some ignition noise which is difficult to eradicate. Talking of eradication, reminds me that Mac 2ZMO is trying to eradicate the Indians out at Raymond Terrace, all the time being chased by some very angry squaws. What a lovely pattern you put on my screen, Mr O'Brien. Sporting a healthy tan is Kev 2ZKW, just returned from the Gold Coast. He needed the holiday after working so hard on that tower you know, and John 2ZJG is at last in the new shack out by the dog's home. Neil 2ZCU and Des 2ZDN are all but ready to put on an Amateur t.v. signal. This is real progress and I wish them all the best with the picture transmission. This information passed on by Bill 2ZCV who also is keeping up with the times by building a really neat and functional g.d.o. I must cajole him to present it to the meeting at the next do-it-yourself night because it really is a fine piece of work.

Harry 2YL, who has not been well of late, did manage to get on the air during the R.D. Contest and is sending in a log. Good work Harry, and I hope the health continues to improve. Bruce Morley is still muttering about that Drake rx, even more so since he saw the demonstration by 2ON and Belmont Bob has at last finished the modulator. To congratulate him, Mrs. Bob gave him a shiny new microphone. And I suppose that even though there is much more to tell of wonder and delight around the Branch, that must be it for now.

Don't forget the Convention will you, all the details are in the Bulletin and last month's "A.R." and also don't forget the next meeting. It will be held, as usual, in Room 15, Classroom block, Newcastle University College, at 8 p.m. on Friday, 4th October, and that's competition night. So be in it, you might win the prize. If the mobile gear isn't working by now, then it's nearly too late, but come along anyway and meet all the boys at Marmong Point. See you there, 73, 2AKX.

SILENT KEY

It is with deep regret that we record the passing of:—

VK3GG—E. L. ("Bon") Guest.

VK3JK—J. K. (Jim) Herd.

BLUE MOUNTAINS SECTION

The August monthly meeting was held at the Lawson Council Chambers on Friday, 16th. There were 13 in attendance, including Norm 4ZNS, who was on a short visit to this State. Arrangements for our Field Day were discussed and it was decided to hold it on Sunday, 27th October. The venue will be the same as last year, the swimming pool grounds at Lawson. All the usual events will be decided, plus others. These include a 40 and 80 mx scramble for portable or mobile stations who are attending the Field Day; home stations who contact portable or mobile stations that are attending the Field Day are eligible for a prize; prize for the best piece of home built equipment. There will also be a display of s.s.b. equipment by Arie 2AVA. Our Field Day has been well attended in the past, and we hope this one will be no exception.

Ron 2ADA has been working in Cooma for the past few months and informs me that he is having t.v.i. trouble when operating on 20 or 40 mx. Ron assures me that he has just about cured this trouble and hopes to be operating on 6 mx shortly, possibly s.s.b.; best of luck with this project, Ron. Wal 2MZ and family have been in hospital recovering from hepatitis. We all wish you a speedy recovery. Norm 2QA has also had his XYL in hospital with hepatitis and for the past few weeks Norm has been chief cook and bottle washer at his QTH. Hope your XYL is better very soon, Norm.

John 2NC (No Clues) has been having his share of troubles with his s.s.b. tx. It appears as though he is putting double sideband into the xtal filter and coming out with a.m. I think there is an easier way to obtain a.m., John. Understand that Derick Boyd has obtained his call, but he has to wait until Nov. before it becomes available. Derick will be operating under 2UX. Ray 2ABY was back on 2 mx recently and had QSOs with 2NC and yours truly. Ray has been operating on 20 mx of late with his s.s.b. rig. Due to studies, he has not been able to put as much time on the air as he would like too. Have not heard anything of Ray Watts. He was to have sat for the A.O.L.C.P. exam., but as yet I have heard no reports. Ken 2AVN is back on 40 mx with the noise. Possible Ken has the same idea as I have, there are no stations on 2 mx. Had a round of golf with 2ADA while Ron was back in this part of the world. The venue for this duel was Springwood. 73, 2ZNS.

— . . . —

VICTORIA

JULY COUNCIL MEETING

Apart from routine matters the evening's business was devoted to matters concerning the property, the news letter and 3WI broadcasts. Firstly the property. It was decided that heating and ventilation definitely had to be given priority and as a result the tender we had for the job would be accepted and the work commenced immediately, in the hope that it would be completed before the next general meeting.

In discussing the News Letter it was reported that the Publications Committee hoped to reduce the notes, which are of limited interest, in favour of information of interest to all States. Due to changed circumstances, there is too much work entailed in editing and re-writing the notes in a more acceptable form before passing them to the printer. To make alterations after the notes are set is an expensive process, and a luxury the magazine cannot afford. The Mag Rep. therefore requested Council's permission to delete VK3 notes from the Magazine and incorporate them in the News Letter. Some members felt this was a drastic step and it was finally agreed that only matters of national interest would find their way into these columns, and our domestic matters will go to the editor of the news letter, who will publish or not as he sees fit. Now as there is little chance of much national importance coming up for publicity, this is to all intents and purposes the last time I'll be doing this job.

Now to 3WI. There has been a lot of dissatisfaction with the broadcasts, some justified and some otherwise. The matter was brought to a head by the fact that it was missed completely on a recent Sunday. Council spent much of the evening trying to find a solution which would be acceptable to all concerned. No useful purpose would be served by going into the pros and cons of the differences of opinion. The most favoured proposal was to call a meeting of all those concerned under an independent chairman to formulate a new

policy. Now to jump the gun and get ahead of the story, nobody could be found to chair such a meeting and it was thrown back into Council's lap. A scheme has now been arranged to see us at least through till the end of this year. If it works well, we carry on the same system in future. If not, then some other scheme will have to be cooked up. No matter which way we look at the problem, we must have more man-power as Council has ruled that, at no time, will operation at 3WI be permitted with only one engineer present. In other words, there must at all times be two on the job, one of whom must have a full licence, the other can be a limited licensee. Now we have automatically increased the number of persons eligible to volunteer, so what about it V.h.f. Group? About a dozen extra on the roster would be ideal, and as it only means attending about one week in six, should not be a great burden. We, on Council, consider this a job for those at present not doing a job for the Institute and thus taking some of the load from Council members who are all now doing four or five jobs each.

The only other matter of general interest for the evening was the Jamboree-on-the-Air. The President (John 3OR) and Ken 3AFJ recently attended a meeting with the organisers of this function at Scout Headquarters and gave a report to Council, who ratified the undertakings given to the Scouts. Elsewhere in this issue you will find further mention of this event and Council hopes that everybody will attempt to help.

AUGUST GENERAL MEETING

So much for the affairs of Council. Let us press on to the August general meeting. The meeting opened on an unhappy note as the President announced the passing of "Bon" Guest, 3GG. A minute's silence was observed as a small token of respect to his memory. Only the older members of the Division will appreciate the value of his work for the Division, especially in the early post-war years.

The agenda item for the evening was a lecture from Kel 3ZFQ, whose subject was "Crystal Filters". Kel very ably outlined the problems encountered and methods of solving them. As I see it, the most necessary commodity used in the construction of these filters is patience, and although I've searched through back issues nobody has advertised it. The meeting's thanks to Kel was expressed in the usual manner.

Only two items of general business were brought up, and as they qualify as being of national importance, they get a mention. This Division has decided, on the vote of members, to ask the F.C.C. to amend the rules of the Field Day to permit 24-hour operation commencing at 1600 hours on Saturday through until 1600 hours on the Sunday. These times of course being E.A.S.T. It was at the same time resolved to outline our case to all other Divisions, seeking their support to get some really prompt action and have the new rule incorporated in the next Field Day.

The other matter raised was incorporating a section in the R.D. Contest for v.h.f. operators. It is believed that this matter already has the attention of F.E. As Federal Councillor was not present, this matter has been deferred until such time as it can be discussed with him.

That's all from me, apart from a greeting to my friend in VK5. Even if I cannot have a shot at him in future in these columns, I'll find some other way.

Now to other VK3 items.

NORTH EASTERN ZONE

Stan Waite passed L.A.O.C.P. and is awaiting call sign. Understand Ray Thomas is all steamed-up to have a go. 3AYD, 3ALF and 3ASY entered into the R.D. Contest. 3AYD installed a VR tube in the rx; now finds less trouble to resolve a.b. sigs. 3ACK still perfecting his technique with the electronic organ and has ventured to instal it in the lounge. This room is now cluttered with speaker enclosures.

The Y.R.C. project is awaiting recruits; not enough youths have come forward to warrant formation of a club as yet. For myself, I have completely wrecked the 1155 and plan to build the R. & H. "Deltahet" front-end and tuneable i.f., so will not be heard for quite some time I guess. 3ASF is in hospital again at time of writing, due to a recurrence of an old trouble. Heard tell 3AUL may be transferring to Gippsland area. 73, 3ASY

MIDLAND ZONE

Despite the absence of notes in the past two issues of "A.R." there is still some activities in the Midland Zone. Members please note that I have at last made my appearance on 80 mx with 8 to 9 watts. I will, however, be on with 90w. within the next few weeks. Our

Monday night hook-ups on 80 mx are fairly well represented from Swan Hill, Elmore, Kyneton, Bendigo and Castlemaine with zone members operating portable in Melbourne. Representation from other areas would be welcome, so what about it fellows on Monday evenings from 8 p.m.

Neville 3ACN is operating a.m. and s.s.b. and is the lone Bendigo station heard on 80. Ian 3MO and Geoff 3AQL active on 20 as well as 80. Kevin 3AHA is a regular on the hook-ups with 3KO also active. Col 3FO not heard recently on 80 but assures me personally he does get on on occasions. Jim 3SV snowed under with official duties at present.

The matter of our general meeting venue which was to be held last month has not yet been finalised, but all members will be receiving official notice shortly as well as over the air on Monday nights. 73, 3ND.

— . . . —

QUEENSLAND

The Sunshine State Contest winner, with 48 points, was Al 4LT, who was closely followed by Alf 4OL with 47 points. Albert is now the proud possessor of a Heathkit multimeter. A practical trophy such as this really inspires the boys to work for it. The VK4s appeared to be in the thick of the R.D. Contest and there has been all sorts of speculation as to how well we went. However, the v.h.f. boys had nothing to do but twiddle their thumbs. Frank 4FN knocked up 23 contacts in one 27-minute session, but duty called just when the going was good and Frank had to spend the rest of the Contest at the place where he least wanted to be at the time. Our President, Pat 4KB, chased all the spiders and wogs out of his rig in preparation for the Contest and when the smoke and the smell died down after the big flash, with Pat's first words, the Contest was well and truly over. Another highlight was the feature photo in the "Courier Mail" of a typical happy smiling Amateur enjoying the delights of the Contest.

One of the visitors to our August meeting was Frank 4FN, from the Central Queensland Branch. Frank reported to us on the progress of his Branch and he really has some progress to report. The membership of this Branch was 104 at last count, and classes are progressing well at the local Technical College, with the odd science master as instructor. Total membership of the Division is now nearing the 500 mark and we look like achieving our aim of 500 before Christmas. Three women have applied for membership of the Central Queensland Branch! It seems that Rockhampton with a population of 50,000 odd can round up more for their monthly meeting than Brisbane with a population of well over a dozen times that of Rocky.

The Division's display in the "Courier Mail" window went off well and we hope to see applications soon from those who had their interest heightened that little extra. We could not get Oscar in time for the display, but if it comes later in the year we will have another one. The Ipswich and District Radio Club also had a window display recently and as a result now have some new members.

So many Amateurs have been travelling hither and yon recently that it's impossible to keep up with all their tricks. Possibly it's only envy speaking but all the Southerners seem to be heading north and vice versa.

The gentleman from Alderley who is kind to fish has been knocking the GO9 tx's into shape and now has them on the air for the 4WI sessions. Good work, Alf. I hear they haven't worked for many years. Eddie 4OW should have his Collins outfit back from Christmas Island by this and perhaps on the air. Eddie has been off colour for a while, but is OK again. Is the Brisbane climate too chilly after Darwin Eddie? Gordon 4GH had a very good contact with a G recently. Trouble is, the G was in Gordon's QTH and not in G-land. The same gentleman will be starting up on 160 metres from Maryborough very soon. What about you making 160 metres your next project fellahs? We hear Arthur 4AW is moving from his Nundah depot. It could be that the disposals chief should be there when he moves and position himself between the door of Arthur's shack and the garbage cans.

Arrangements are coming along fine for the Jamboree-on-the-Air and some 60 odd stations will be in operation. Let's hope conditions will be good. Our country spies seem to have fallen by the wayside, but let's hope they can make it next time. If we don't get news, we can't print it, can we? 73, 4ZGM.

TOWNSVILLE AND DISTRICT

It was pleasing to read in "A.R." just to hand that the Cinderella or Sunshine State has acquired a new Sub-Editor. It is to be hoped that he reigns long and is not deterred with the spectre of the blue pencil.

Things over the past month have been very quiet on the bands, especially after the tumult had died down from the R.D. Contest. It was pleasing to note that some of the chaps had really high numbers in the scoring and when taking the points into account, Queensland should rate higher than last year. Also noted that the 3.5 Mc. band was crowded. As usual, I worked sufficient to submit a log and count for the State; worst of being a shift worker. Basil 4ZW was sorely tempted to stay home from work on the Sunday as he had lost his voice (the kids had relief).

Word has been received from the Z boys in Cairns that they expect an opening on 6 mx at any time. They have heard the trans-equatorial scatter on a number of nights and the pulse stations are coming in around 49.9 Mc. Nary an opening to Townsville as yet, although I have listened at the times they have been heard.

Claude 4UX is getting out the broomstick to make sure that the locals help out in the Scout Jamboree. Quite a few southern boys enquiring if there will be any activity in this area. Well chaps, it will depend on the Scouts themselves as all the local Amateurs are always ready and able to help out at any time when asked.

Frank 8AE has dropped in twice and now on his way to Rocky per motor bike. Never know he may decide to live in your city. Bert 4LB managed to get a sky hook up for 80 and now joins in the hook-up. It is amusing to hear the boys on this band as the dishes required to be washed up. What an excuse for missing out when talking to 4RW. Just as well I can take it!

Now is the time chaps when it behoves you one and all to think wisely and remember to weigh in for the I.T.U. Fund, otherwise we will be curtailed in our personal representation at the Conference. Don't be like last time. Only a few had the interest at heart and subscribed. Help now, remember we had a poor response from the individual Amateurs in Queensland last time as my index carefully compiled shows.

Just met Allan 4BE, who is busy packing up on transfer to the big smoke. He will be sadly missed by all as it never was any trouble to him to come around and help out anyone who was having a bit of strife in keeping on the air. Could always be relied upon to stand by and give test, etc. Not everyone suffers from Mondayitis, because recently my local QRM rolled up at work at 6 a.m. and was told that it was his day off! Wouldn't it. 73, 4RW.

— . . . —

SOUTH AUSTRALIA

The monthly general meeting of the VK5 Division was held this month as usual in the clubrooms to a very representative gathering of 52 members, which for interstate consumption I announce the figures were audited by that well known firm of Ananias-Ananias and Ananias, and took the form of a display of members' home-constructed equipment.

Quite a representative collection of gear was displayed and explained by the exhibitors, and the three awards went to Ron 5KS for his s.s.b. equipment, both transmitting and testing; Bob 5ZDX for his 6 mx mobile tx and converter, and last but by no means least, George Edmeads for his c.r.o., which, as he proudly proclaimed, was made from plenty of bits and pieces. Nice work gentlemen.

Other equipment dispalyed, not necessarily for judging, included a tape deck by Geoff 5TE, Keith 5KH with a mobile transceiver, Doug 5KK with a transistorised mobile power supply of 180 watts, and a mobile tx for 7-50-144 Mc.; Ron 4ZDC with a yagi beam which included a novel method of terminating the feeders, Al 5MF with a s.s.b. rx plus plenty of propaganda for the said s.s.b.! and Trevor Marshall for a 6 mx rx. Incidentally, Trevor took the floor like a veteran and gave a description of his rx which would have put to shame many a member present, three times his age. He attends the Plympton High School and if this is an example of the present day student, then we have nothing to fear for Amateur Radio in the future, practically or administratively. An excellent display, gentlemen, and thank you for making the night so interesting.

Noticed Roy 5DA, "Buck" to you, sitting talking to an old-timer in Marshall Hider during the meeting, and in a chat with Marshall later, he said he felt quite at home after all these years, but did not know more than a handful of the members present. I told him not to worry about that, I attend almost all the meetings and don't know half the members present myself.

Somehow or other the visitors' book managed to get lost and all the visitors had to stand up and announce themselves. Imagine the fright I got when I heard one of them stand up and say, "My name is George Glover." Diving under the nearest chair and waiting for the shots in my direction, I was more than relieved to hear that the visitor was not a VK3, but a G3FFO who has settled in VK5 and intends to take out a licence. He tells me that he has spent quite a while in Egypt and has worked plenty of VK5s. Know him? The whole business upset me terribly. I could not sleep all night. I kept on hearing a voice saying, "I am Ken Pincott," and then the machine gun would start. I tell you, you can't trust these VK3 jokers. They bob up all over the place without warning.

Very little to report from the S.E. of VK5 for this month. At their last monthly meeting night there was an unusually small attendance, only 5MS, 5KU, 5CJ, 5ZLS and Col Hutchesson being present. Opportunity was taken to welcome Erg 5KU back to the fold, so at least what little news there is to report is good.

Claude 5CH heard on 7 Mc. at various times, in fact I even had a contact with him myself. Claude is shortly to venture into the unexplored wilds of VK6 for a holiday. Hope you have a good time OM.

Had a listen on 3.5 Mc. around midnight the other week and was rewarded with a listen-in to a contact with a maritime-mobile station in Olaf 3AHI and Alex 2JZ. Olaf was en route to Whyalla and was using a transistorised set-up that had to be heard to be believed. Have not heard any more of him since, but then I don't usually listen that late, only when my conscience bothers me or when there is a rumour of an invasion from VK4.

The Woomera Radio Club, 5WC, was heard at good strength the other Saturday afternoon working everybody right and left. It appears that the club was celebrating its 10th anniversary and was endeavouring to contact as many stations as possible on the day and was handing out special QSL cards to prove it.

Understand that the Crystal Brook gang are tinkering with the idea of having another get-together of the boys, possibly in November. This is a privately arranged "do," but anybody who is interested is always welcome and any information could be obtained from Luke 5LL or Dave 5DS. Judging by the success of the last one, the attendance this time should be a bumper.

Doug 5EI, our worthy Treasurer, and Pat 5US, our genial Secretary, have both resigned from their respective positions and their places have been taken by a couple of Harry's—Harry 5MY who will be Treasurer and Harry 5EU who will be the Secretary. We are sorry to see the first two go, they have done a good job, even if Pat did post me the Council minutes and cost me an excess postage of one bob, and we welcome the last two who, incidentally, volunteered for the job, and can we say any more in their favour than that. Nice work boys, we salute you.

Another retirement from the Council is Clive, who was the operator of 5WI. He is another one who has done sterling work for the Division and the Council, giving a lot of his time for the benefit of Amateur Radio in general, and is probably better known under the call sign of 5PE.

It was decided by Council that the VK5 journal will be issued every two months and the technical articles shall be the responsibility of the Technical Committee. The editorial staff will still be Brian 5CA and his telephone is 79-2621, and he will not be too proud to answer it if you ring with any items of news for the journal. If you are nervous of microphones, you may still write to him at 34 Fisher St., Fullarton, and if by any chance you can't write, or you have no pen or paper, he is not above lending an ear at the general meetings.

Don 5TM is re-broadcasting the 5WI Sunday morning session on 160 mx and it is putting a solid strength 9 throughout the Adelaide area. It is on an experimental basis at present and reports would be appreciated from listeners far afield with the object of relating any reports to the 40 watts input being used.

The new Technical Committee for VK5 was launched recently and big things are expected of this body. Naturally its role is an important one and can benefit all active Amateurs. If you have a problem don't hesitate to get in touch with the Committee, don't be too proud or too shy, who knows, you might stump them. O——hh, if only I could, but I am afraid it is wishful thinking.

Jim 5JK is home from hospital at the moment of writing, but is still confined to his bed, and may be there for another month.

Council recently visited the Elizabeth Park Boys' Technical High School and had a close-up of the facilities provided for teaching elementary electronics. Whilst maintaining a close silence on their opinions of the effects of the visit, one of my spies planted in Council tells me that the Youth Radio Scheme, as implemented

in the other States through High Schools, may have to be modified before it can be adopted in VK5. Council is considering all the aspects of this before committing the members to the task of implementing any youth training in radio in VK5. Are you listening Ken??

This month saw the introduction of a new radio serial, "The Green Valleys," which is fast becoming VK5's answer to "The Blue Hills." The leading male role is taken by George 5CV, the leading female role is taken by "Mum" (XYL of George), the male juvenile lead by Mate 5AO and the juvenile female interest by "Jen" and "Missy". George 5CV has been travelling through VK3, VK3 and VK4 and with his mobile set-up has been on sked with his harmonic, Mate 5AO, on 7 Mc., nightly at 5.30 p.m. I have not missed an episode and have alternated between joy, tears, suspense, and have even eaten my fingernails up to the elbow at the hair-raising doings of the intrepid travellers. Joking aside, George, hope you had a good long trip and you and "Mum" enjoyed yourselves. Incidentally, how low can one sink? "Mum" wanted to go to Scotland for your long leave, aren't you going in the wrong direction? Also, don't think we swallowed that yarn about running out of petrol at Hay, nor that you had left your bankbook home! You will get your just deserts, George.

Well, I can see the red pencil poised in the graceful and artistic fingers of Ye Ed., so I had better take the hint, after all he might make me make way for F.E., just like he said. You were only joking, weren't you, my old paisy,waisy. 73, de 5PS (PanSy to you).

— . . . —

WESTERN AUSTRALIA

Gee, some people are keen. I have been told that 6KN was heard calling on 80 mx at 20 minutes to 12, our time. No, not during the day, but during the dark time. Somebody must have been about because he had just finished a contact with a VK3 who appeared to be knocking caps off 807s.

Talking about knocking things off, I believe that 6VA has been knocking a European or two off with his two element beam for 14 Mc. on the long path to Europe. Congrats., OM. Presume the next project will be to add the third element and then you'll hit the spots, probably both ways at once.

Some months ago we mentioned, on our sick list, the name of Rose Hardwick, L8002. Rose has, with Eric L6001, her XYM (that means "ex young man" as if you didn't know) been a tower of strength on the listeners' side of the Division. We are pleased to know that Rose's health has improved and she is now back at work again.

Lady members reminds me, after discussing Aileen 6YL and Bill 6RX last month, I am happy to report that Aileen gave a good account of herself during the recent R.D. Contest, as did Bill, who says his Collins 75A4 has been returned from Melbourne where it had been under repair. So we should be able to hear a signal or two now, Bill.

That reminds me, some of our Advisory Committee boys have mentioned that they have heard unmodulated carriers operating in the Ham bands. All members are reminded that they should identify themselves when testing. If you are working on the tx only, work into a dummy load. If on the sky wire, say who it is, even though you may not think you are getting out—you could be surprised!

Had another funny one at the Council meeting, too. Alyn 6ZDM was telling us the things he cops on 50 Mc. Y'r know the way he does? Presumably they were in layers coming out of the speaker, couldn't separate them at all. Vic 6VK came in with, "that's the trouble with these broad-band crystals." Don't understand that one. I always thought crystals were fairly sharply tuned devices; however!

One sharply tuned device which is giving trouble is that beam of 6LR. Lance is still having problems. Soon he'll have someone to talk over his problems with as Lance's XYL is getting interested in this side of her husband's affairs. How about getting the XYL to take a note or two for the "A.R." col., Lance? Women are so good at that sort of thing.

There's no doubt about it, people get up to some odd things when they become Hams. I have a report that Tom 6KS has a great heap of empty (repeat, empty) beer cans in his back yard and is thinking of coming back on the air again. All right! Ask the obvious question and see where it gets you. As it happens there is a quite sound and logical reason for Tom to have a pile of empty beer cans in his yard. Apart from the fact that he can't carry them away, he's going to make a "beer can vertical" so there! Hope it doesn't stagger about too much Tom. I'll be interested to see how it works, if nobody else is!

Shades of the R.D. and all that. Jim 6RU must have kept pretty close tabs on who was operating, because I heard him mention that there were 13 or 14 Hams who didn't operate. He's keen, that boy! All the best, 73, 6LS.

— . . . —

TASMANIA

As our usual scribe is out of action this month, yours truly has been delegated the task of lapsing into journalism. 7ZZ, our usual correspondent, met with an accident concerning a glass door and was "awfully cut up about things," necessitating hospitalisation and a fairly long recovery period. Seriously, Ian, we all wish you a speedy recovery.

Believe that Pat 7GV has become the proud owner of a 122 set. Getting ready for a run at the Hamfest, Pat? Heard a lot of strange VK? call signs on the air during the R.D. Contest. Had to check the call book to see whether they were legitimate. How about letting us hear you on the air more regularly?

A very successful auction was held at the conclusion of the August meeting and many bargains were picked up by members. I hope everybody is getting geared up for the Hamfest early in November, to be held in the Cambellstown area. Get that mobile gear out and dusted off in readiness and get that whip aerial pruned and tuned and let us see just how many mobile stations we can get on the air for the occasion. Those who attended the last show will remember what a grand time was had, so pass the word along.

Our next event requiring the co-operation of Amateurs will be the Jamboree-on-the-Air, to be held in October. So get with it chaps and make this the best Jamboree yet. Remember, your assistance can make or mar the whole show, so let's make and not mar.

That's all for this month, so cheers to all, and remember, "The I.T.U. is up to you." 73, Charley Tango.

NORTH WESTERN ZONE

We have had a visitor to the zone recently in Geoff 7ZAC, who also came along last meeting to show his 2 mx portable rig.

The proposed Civil Defence Communications system has been put before us and a recorded tape on the subject sent for our enlightenment. However, due to many impractical aspects, not the least being the use of the 27 Mc. band, little interest has been aroused.

Very pleasing indeed to see the meetings so well attended, but more radio activity on the air, on the work bench, and with the text books is applicable for most of us, myself included! Let us hope an A.O.C.P. class does eventuate for the benefit of our many associates.

Very sorry to see that fellow scribe 7ZZ is in hospital. Wish you a speedy recovery, Ian.

And don't forget the I.T.U. Fund. The response so far has been poor. I'm sure we all realise just how vital is the need for a representative at the Conference. 73, 7ZBH.

HAMADS

Minimum 5/-, for thirty words. Extra words, 2d. each.

Advertisements under this heading will only be accepted from Institute Members who desire to dispose of equipment which is their own personal property. Copy must be received at P.O. Box 36, East Melbourne, C.2, Vic., by 8th of the month, and remittance should accompany the advertisement. Call signs are now permitted in Hamads. Dealers' advertisements not accepted in this column.

FOR SALE: Complete Amateur Radio Station comprising A.W.A. R.A.A.F. Transmitter, Type AT21; Philips Receiver No. 4; Microphone, Loudspeaker, American type speed key, all in good condition and ready to go on the air. Owner going overseas. All at £40. Telephone VK4JL 48-1294 or call to view, 17 Venner Rd., Annerley, Brisbane, Queensland.

FOR SALE: HA2 Hallicrafter Tranverter, transmits and receives a.m., s.s.b., f.m. or p.m. on 144/148 Mc. receive down to 3 db. noise with nuvistors. Final 5894 in AB1. Can be fed with either high or low level exciter at 28 Mc. Excellent condition, good 2 metre DX or satellite unit. £160. VK2AAK, P.O. Box 1, Kulnura, N.S.W.

FOR SALE: HT37 Hallicrafter s.s.b. and a.m. and c.w. Transmitter, all bands 10/15/20/40 and 80 metres, top notch condition, unmodified, table top unit with in-built power supply, purchased new, £240. VK2AAK, P.O. Box 1, Kulnura, N.S.W.

FOR SALE: Swan S.s.b. Transceiver, Model SW-140, 40 metre band, used but perfect condition, no power supply, £140. Arie Bles, VK2AVA, 33 Plateau Rd., Springwood, N.S.W.

SELL: Heath Mohawk Receiver, 160-10 & 11, 6 & 2 conv., s.s.b., c.w., and a.m. SB10 Apache, 200w. s.s.b., 150w. a.m., fan cooled. J. Mullins, 31 14th Avenue, Kedron, Qld. Phone 59-2268. Less than half price.

S.S.B. Filter Crystals per set of six, incl. carrier crystals, 5780 or 375-430 and 495-535 Kc., 3 Guineas. Same filters aligned, mounted in plug-in shielded cans, 6 Guineas. Mounted FT 243 Crystals, any frequency, 3.8 to 6.5 Mc., 0.01%, 15/- each. Some 40 metre crystals also 15/- each. VK2AVA, A. Bles, 33 Plateau Road, Springwood, N.S.W. Phone 394.

V.H.F. Enthusiasts! TS 174/U Frequency Meter, similar to BC221 but range 20 to 250 Mc., spotless condition, with own calibration book, 50 Guineas. VK2AVA, A. Bles, Springwood, N.S.W.

WANTED: Cheap as poss., Super Pro AMR200, or similar, for re-building. Any condition, provided tuning intact. N. Duncan, WIA-L3104, 14 Kenbry Rd., Heathmont, Vic. 870-1595.

CORRECTION

It is regretted that in VK2AVA's advert last issue the price of the linear amplifier was incorrect. It should have read £75.